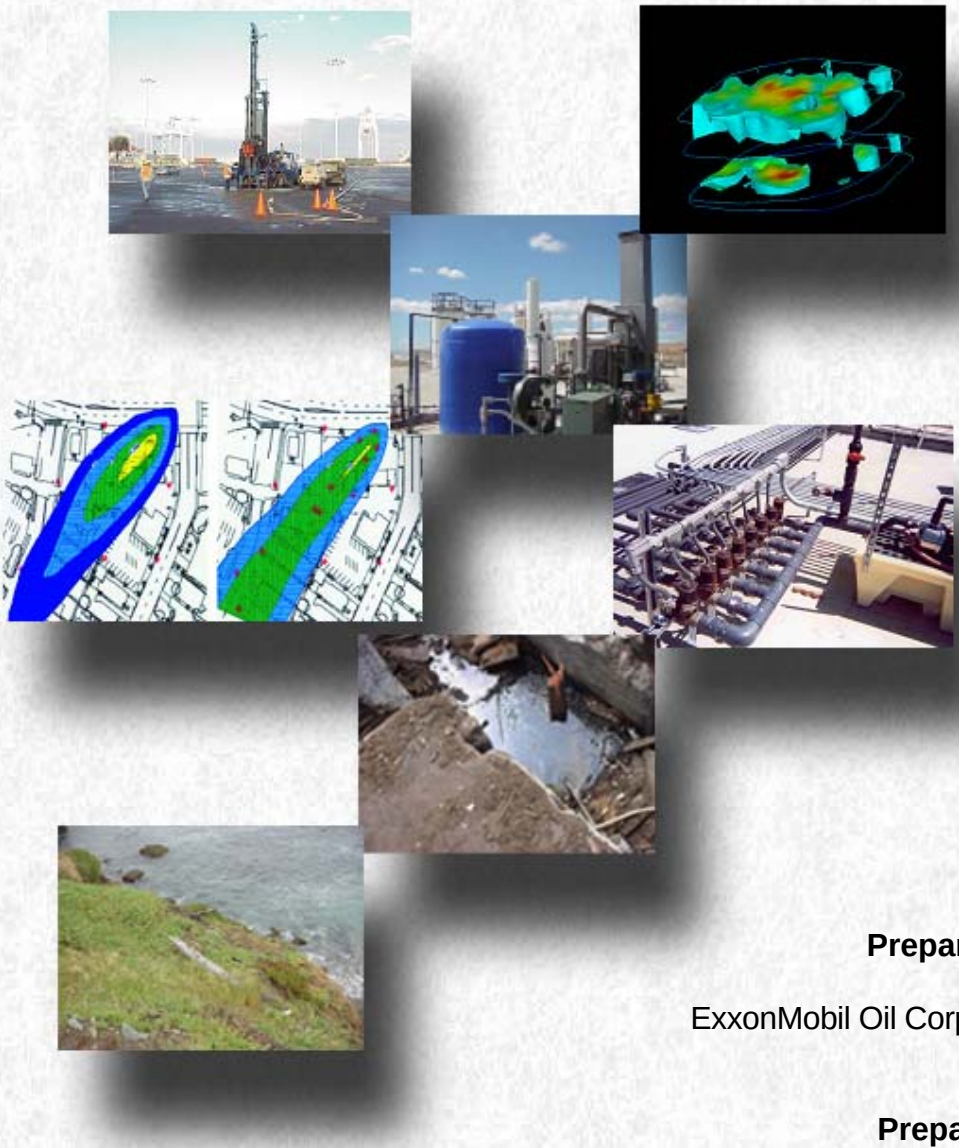
Draft Work Plan for Interim Remediation

Former Mobil Renton Terminal #46-080
2423 Lind Avenue SW, Renton, Washington



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OCTOBER 8, 2009

DRAFT WORK PLAN FOR INTERIM REMEDIATION

PREPARED FOR

Former Mobil Renton Terminal
Washington State Department of Ecology Identifier 2070, ConocoPhillips Renton Terminal
2423 Lind Avenue SW
Renton, Washington

PREPARED BY

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1. INTRODUCTION

This report was prepared for ExxonMobil Environmental Services on behalf of ExxonMobil Oil Corporation (ExxonMobil), for the former Mobil Oil Corporation (Mobil) Renton Terminal at 2423 Lind Avenue SW in Renton, Washington (site; **Figures 1** and **2**). The site is currently owned and operated by ConocoPhillips. The Washington State Department of Ecology (WDOE) identifier is 2070.

The site is an active petroleum terminal operated by ConocoPhillips and occupies approximately 7 acres. Mobil, predecessor to ExxonMobil, owned and operated the site until 1988 when the product storage and transfer facilities were sold to British Petroleum.

Mobil identified petroleum-impacted soils in July 1986 while removing an underground storage tank in the vicinity of the loading rack. Investigation and testing suggested the source was cracks in the loading rack spill containment system, which were repaired. The petroleum product was identified as primarily leaded gasoline.

Environmental assessment activities were conducted from July 1986 to October 2007. Liquid phase hydrocarbons (LPH) were observed on the water table to the west and northwest of the loading rack (Section 2). Based on the presence and distribution of LPH, an assessment of potential interim remedial measures (IRMs) was performed (Section 3), and a combined product recovery system and ground water extraction and treatment system (GETS) was recommended.

The WDOE issued Enforcement Order DE 87-N301 on October 14, 1987, and two amendments on November 3 and December 16, 1987. The order required the installation of the product recovery system and GETS, which was implemented as an initial IRM. System operation began in November 1987 (Section 4). After removal of more than 55,000 gallons of LPH, the product recovery equipment was removed and the IRM was converted to a GETS-only system in 2002 (Section 5). Beginning in 2006, a number of upgrades were made to the GETS to improve performance, including reconstruction of a recovery trench in 2008 (Section 6). Operation of the GETS in its current configuration is the ongoing IRM (Section 7).

This report was prepared in accordance with Washington Administrative Code 173-340-430 (7) regarding submittal requirements for an interim action.

2. SITE CONDITIONS

2.1 Geology and Hydrogeology

Stratigraphic units, from top down, consist of a sand fill, a silty clay aquitard, and a sand unit underlying the aquitard. The sand fill is observed from ground surface to approximately 10 feet below ground surface (bgs). Underlying the sand fill, the aquitard thickness is inferred to range from approximately 2 to 4 feet across the site.

The ground water table fluctuates seasonally, with depth to ground water observed from approximately 3 to 10 feet bgs. Operation of the IRM influences the ground water flow. Absent IRM operation, the inferred direction of ground water flow is generally toward the north and/or northwest.

2.2 Liquid Phase Hydrocarbons

Figure 3 illustrates the LPH measured in monitoring wells on November 10, 1987. On this date, measureable LPH was observed in monitoring wells B-1 through B-4, B-6, HA-2, HA-6, HA-9, HA-11, W-2, and W-4, at a thickness ranging from 0.07 foot in monitoring wells B-1 and HA-6 to 1.29 feet in monitoring well B-6.

The implementation of the initial IRM has reduced the occurrence of LPH. LPH was not observed in the monitoring wells in the 2008 semi-annual monitoring events in June and August (**Table 1**).

2.3 Ground Water Quality

Historical ground water sample analytical results for total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), total petroleum hydrocarbons as motor oil (TPHo), and benzene, toluene, ethylbenzene, and xylenes (BTEX) are in **Table 2**. Historical ground water sample analytical results for methyl tertiary butyl ether (MTBE) and ethanol are in **Table 3**. **Figure 4** illustrates concentrations of TPHg, TPHd, and benzene reported in ground water samples during 2007 and 2008.

Results for the 2008 ground water sampling events in June and August are summarized below.

2.3.1 Total Petroleum Hydrocarbons as Gasoline

TPHg concentrations reported in ground water samples obtained during the June 2008 monitoring event ranged from less than the method detection limit (MDL) of 43.0 estimated (J) micrograms per liter [µg/L] to 200,000 µg/L in the ground water sample from monitoring well B-3A. In samples from 18 monitoring wells (B-1 to B-6, HA-2, HA-5 to HA-11, and W-1 to

W-4), reported TPHg concentrations exceeded the Model Toxics Control Act Method A Cleanup Level (Cleanup Level) of 800/1,000[1] µg/L (**Table 2**).

TPHg concentrations reported in ground water samples obtained during the August 2008 monitoring event ranged from less than the MDL (43.0 µg/L) to 171,000 in the ground water sample from monitoring well B-3A. In samples from 16 monitoring wells (B-1 to B-6, HA-2, HA-5 to HA-10, and W-2 to W-4), reported TPHg concentrations exceeded the Cleanup Level of 800/1,000[a] µg/L (**Table 2**).

2.3.2 Total Petroleum Hydrocarbons as Diesel

TPHd concentrations reported in ground water samples obtained during the June 2008 monitoring event ranged from less than the MDL (19.0 µg/L) to 46,300 µg/L in the sample obtained from monitoring well W-2 (**Table 2, Figure 4**). In samples obtained from 17 monitoring wells (B-1 to B-6, D-7, HA-2, HA-6 to HA-9, HA-14, and W-1 to W-4), reported TPHd concentrations exceeded the Cleanup Level of 500 µg/L.

TPHd concentrations reported in ground water samples obtained during the August 2008 monitoring event ranged from 34.1 J µg/L in the ground water sample obtained from monitoring well HA-13 to 15,100 µg/L in the ground water sample obtained from monitoring well W-4 (**Table 2**). In samples obtained from 16 monitoring wells (B-2 to B-6, D-6, HA-6 to HA-10, HA-12, HA-14, and W-2 to W-4), reported TPHd concentrations exceeded the Cleanup Level of 500 µg/L.

2.3.3 Benzene

Benzene concentrations reported in ground water samples obtained during the June 2008 monitoring event ranged from less than the MDL (0.270 µg/L) to 40,800 µg/L in the ground water sample obtained from monitoring well B-3A (**Table 2, Figure 4**). In samples obtained from 20 monitoring wells (B-1 to B-6, D-6, D-7, HA-2, HA-6 to HA-11, HA-14, and W-1 to W-4), reported benzene concentrations exceeded the Cleanup Level of 5 µg/L.

Benzene concentrations reported in ground water samples obtained during the August 2008 monitoring event ranged from less than the MDL (0.270 µg/L) to 47,500 µg/L in the ground water sample obtained from monitoring well B-3A (**Table 2, Figure 4**). In samples obtained from 19 monitoring wells (B-1 to B-6, D-6, D-7, HA-2, HA-5 to HA-10, HA-14, and W-2 to W-4), reported benzene concentrations exceeded the Cleanup Level of 5 µg/L.

[1] MTCA Method A specifies a Cleanup Level of 800 µg/L if benzene is present or 1,000 µg/L if benzene is not present.

3. SCREENING AND SELECTION OF INTERIM REMEDIAL MEASURE

In accordance with Washington Administrative Code (WAC) 173-340-430, an interim action is:

- A remedial action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility;

- A remedial action that corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed; or

- A remedial action needed to provide for completion of a site hazard assessment, remedial investigation/feasibility study or design of a cleanup action.

The three alternatives considered for the IRM were no action/natural attenuation, LPH recovery, and LPH recovery coupled with ground water extraction and treatment.

3.1 No Action

No action relies on natural attenuation to remove LPH and chemicals of concern (COCs) from the subsurface. This alternative is the least costly of the remedial measures considered and the easiest to implement; however, this alternative does not include hydraulic control for LPH migration. Of the remedial alternatives considered, no action requires the longest timeframe to achieve the Model Toxics Control Act Method A Cleanup Levels (Cleanup Levels).

3.2 Product Recovery

Product recovery entails removal of LPH from the water table surface with pumps installed in recovery wells and/or trenches. Compared to the no action alternative, removal of LPH from the water table surface reduces the potential for LPH migration and likely reduces the time to reach the Cleanup Levels. Although LPH migration potential is reduced, product recovery does not provide hydraulic control for LPH or dissolved COCs. Compared to no action, product recovery is more costly. Implementation of product recovery at the site includes intrusive construction that would require coordination with terminal operations. Other implementation issues are not deemed significant, as summarized in the SEPA environmental checklist (Appendix A).

3.3 Product Recovery with Ground Water Extraction and Treatment

Product recovery coupled with a GETS adds hydraulic control to the LPH removal. In this alternative, both product removal and ground water extraction pumps are installed in recovery wells and/or trenches, and a treatment system for the extracted ground water is installed in addition to product recovery equipment. The addition of the GETS increases both installation and operation costs compared to product recovery alone; however, the water table depression caused by ground water extraction facilitates LPH recovery, provides hydraulic control to limit

migration of LPH and dissolved COCs, and likely reduces the time to achieve Cleanup Levels. Implementability is comparable to the alternative of product recovery alone.

3.4 Comparison of Alternatives and Selection of Interim Remedial Measure

The no action alternative was discussed as a baseline for which to compare other alternatives, but based on site conditions, no action was screened from selection as an IRM because the alternative 1) is not consistent with WDOE expectations for cleanup as described in Washington Administrative Code 173-340-370, and 2) would not comply with WDOE Enforcement Order DE 87-N301. Of the two remaining alternatives, product recovery with GETS is more costly to install and operate than product recovery alone. However, the ground water extraction added to product recovery facilitates LPH removal and provides hydraulic control to limit migration of LPH and dissolved COCs. Implementation issues for product recovery alone and product recovery with GETS are similar. Product recovery with GETS was selected as the initial IRM.

3.5 Environmental Checklist

The State Environmental Policy Act (SEPA) environmental checklist for implementation of the IRM is included in this work plan as Appendix A.

4. PRODUCT RECOVERY AND GROUND WATER EXTRACTION AND TREATMENT SYSTEM FOR INTERIM REMEDIATION, 1987 TO 2002

4.1 Process Description

Installation of the recommended product recovery with GETS occurred in 1987. Two gravel-filled recovery trenches (Trench 1 and Trench 2, **Figure 2**) were constructed, with Trench 1 located west of the loading rack and Trench 2 located near the northwest boundary of the site. A recovery well was installed in each trench (R-1 and R-2), with each recovery well containing a product recovery pump and a ground water extraction pump.

Ground water and LPH conveyance piping ran from the recovery wells to a treatment compound located southwest of the loading rack. Recovered LPH was pumped through a totalizer to an in-ground 15,000-gallon product storage tank located west of the loading rack. The recovered LPH was disposed of by a licensed waste fuel recycler. Extracted ground water was pumped through an in-ground oil/water separator for removal of residual LPH and then through an air stripper for treatment of dissolved COCs. Treated ground water was initially discharged to the main wastewater collection system for the terminal, but in 1991 the discharge was reconfigured to discharge to the King County sanitary sewer system. A copy of the manual for the product recovery and GETS is in Appendix B.

4.2 Performance

The product recovery and GETS was started on November 16, 1987. Except for the modified discharge, the system operated in the initial configuration until November 2001. The system recovered more than 54,000 gallons of LPH during the first 5 years of operation (November 1987 to November 1992), after which time the recovery rate decreased. As of November 2001, when the system was shut down for repairs and modification, the system had recovered more than 55,000 gallons of LPH.

The initial 14 years of operation reduced the amount of LPH. As discussed in Section 2.2, measureable LPH was observed in eleven monitoring wells immediately prior to system startup in November 1987. During 2001 ground water monitoring, measureable LPH was observed in four ground water monitoring wells (B-2, B-3, W-1, and W-4).

The system was shut down in November 2001 because of fouled air stripper packing. (Records indicate the system was shut down at least twice prior to 2001 to replace fouled air stripper packing). Based on the decreased LPH recovery rate and the reduction of measureable LPH in ground water monitoring wells, the decision was made to convert the IRM to a GETS-only system.

5. MODIFICATION OF INTERIM REMEDIATION TO GROUND WATER EXTRACTION AND TREATMENT SYSTEM, 2002 TO 2006

5.1 Process Description

In 2002, the system was modified to operate only as a GETS. Product recovery pumps were removed, the in-ground oil/water separator was removed, and the LPH conveyance piping was plugged. The ground water extraction pump in each recovery well was replaced, the treatment compound was expanded, and a new aboveground coalescing-plate oil/water separator was installed in the compound. A product recovery drum was added and connected via transfer pump and flow totalizer to a 1,000-gallon product storage tank located within the tank farm berm.

In the converted system, extracted ground water is pumped from the recovery wells to an equalization tank, from where the ground water flows by gravity to the oil/water separator and then flows by gravity to the air stripper feed tank. The ground water is pumped from the air stripper feed tank through a totalizer to the air stripping tower for treatment and discharge to the sanitary sewer. Recovered LPH (if any) separated from the ground water by the oil/water separator flows by gravity into the product recovery drum, from whence it is pumped to the product storage tank.

In conjunction with the system conversion work during 2002, the fouled air stripper packing was replaced.

5.2 Performance

The converted system was started on February 28, 2003. The following volumes of ground water were extracted during the first 4 years of operation following the system conversion:

Year	Ground Water Extracted (gallons)
2003	537,677
2004	814,460
2005	186,327
2006	550

The system performance decreased during 2005 because of fouling of the air stripper packing, and was shut down in 2006 to replace the air stripper packing and to upgrade the system.

6. UPGRADES TO THE GROUND WATER EXTRACTION AND TREATMENT SYSTEM, 2006 TO 2008

6.1 Upgrades to Reduce Fouling and Improve Performance Monitoring

During 2006, the air stripper packing was removed because of fouling from a combination of solids, iron precipitate from ground water, and iron bacterial growth. The interior of the air stripper tower, oil/water separator, air stripper feed tank, and equalization tank were steam cleaned. New packing material was placed in the air stripper tower.

In addition, the following upgrades were made to the GETS to reduce fouling and improve performance monitoring:

- Air and water filters were installed to reduce the amount of solids entering the air stripper
- Vacuum gauges were installed to monitor differential pressure across the filter for the inlet air to the air stripper
- Pressure gauges were installed to monitor differential pressure across the filter for the inlet ground water to the air stripper
- A chemical dosing system was installed for injection of sequesterant to reduce iron fouling
- Pressure and temperature gauges were installed on the air stripping tower
- Pressure gauges and rotameters were installed in the discharge lines from the ground water extraction pumps to the equalization tank
- Flow control valves were installed in the discharge lines from the ground water extraction pumps to the equalization tank
- An hour meter was installed for each ground water extraction pump

6.2 Installation of Heat Tracing

In January 2007, heat tracing was installed on aboveground treatment system piping and equipment for freeze protection during the winter months.

6.3 Installation of Additional Filtration Capacity

In July 2008, additional filtration capacity was installed to decrease downtime caused by iron precipitate from the extracted ground water. Filtration capacity was increased from 1 square foot to 8.8 square feet.

6.4 Reconstruction and Restart of Trench 2

6.4.1 Reconstruction of Trench 2

Investigation to assess the performance of Trench 2 was conducted in June and October of 2007. As described in the *Trench 2 Investigation Report* dated November 5, 2007, finer-grained sediments found in the bottom portion of the gravel-filled trench appeared to limit ground water recovery, resulting in the decision to improve recovery by reconstructing Trench 2.

Construction for the upgrade of Trench 2 occurred from November 6 to December 4, 2008. The upgrade work consisted of excavating 236 tons of original backfill material, removing wells R-2, W-3, and W-4, placing a horizontal perforated pipe along the bottom of the re-excavated trench, installing an extraction riser (R-2A) in the interior portion of the trench, installing cleanout risers W-3A and W-4A near the ends of the trench, backfilling with pea gravel, and re-paving. An as-built drawing of the upgraded trench is shown on **Figure 5**.

6.4.2 Restart of Trench 2

Trench 2 was restarted on December 17, 2008. The attached **Figure 6** graph shows measured drawdown in Trench 2 and nearby monitoring wells versus elapsed time after the start of pumping on December 17, 2008. Measurements continued into the afternoon of December 18. The extraction pump in well R-2A was operated at an average flow rate of approximately 2.8 gallons per minute. At an elapsed time of approximately 1270 minutes, the pump began to cycle between the set points of the control floats. The high and low elevation set points were observed to correspond to approximately 1.9 and 2.3 feet of drawdown, respectively.

Within Trench 2, the maximum drawdown observed at W-3A was 1.50 feet, and at W-4A it was 1.85 feet. In both cases, the maximum drawdown occurred when the water level in the trench reached the bottom of the drain pipe. The observed drawdown is markedly improved from the original Trench 2, in which the measured drawdowns at W-3 and W-4 after two days of pumping were 0.08 and 0.34 foot, respectively. (Testing of the original Trench 2 was performed in June of 2007).

Measurable drawdown was observed in nearby monitoring wells HA-1 and HA-9 through HA-11. After approximately 1 day of pumping, the observed drawdowns were: 0.07 foot at HA-1, 0.26 foot at HA-9, 0.07 foot at HA-10, and 0.17 foot at HA-11. Again, the results are much improved from the testing performed on the original Trench 2 in 2007, particularly at HA-9 and HA-11, which are near the ends of the trench. When the original Trench 2 was tested in June of 2007, only HA-10 exhibited measurable drawdown after 1 day of pumping. The observed drawdown at HA-10 was the same as in the recent test, probably because it was the nearest monitoring well to the original extraction well R-2.

Observations obtained during the startup indicate improved performance of the upgraded Trench 2. The upgraded Trench 2 affects greater drawdown at the ends of the trench, and thus extends its area of capture and inflow rate relative to the original Trench 2. Based on operating performance during the first quarter 2009 compared to the first quarter 2008, the long-term

pumping rate of Trench 2 appears to have increased from approximately 0.90 gallon per minute prior to the trench upgrade to 1.3 gallons per minute since completion of the upgrade.

6.5 Performance of the Upgraded GETS

Following the upgrades discussed in Sections 6.1 and 6.2, the GETS extracted 619,000 gallons of ground water during 2007 and 483,000 gallons during 2008. As discussed in Section 6.3, the reconstruction of Trench 2 appears to have further increased system performance.

7. ONGOING OPERATION

Drawings for the existing GETS are in Appendix C. Ongoing operation of the existing GETS is proposed as an IRM as discussed below.

7.1 Monthly Operations and Maintenance Activities

Monthly operations and maintenance activities for the GETS include the following:

- Observation of system operating time and operating times for each extraction pump
- Observation of sewer discharge flow rate and totalizer reading
- Observation of instantaneous flow rates from each extraction pump, and adjustment of flows as deemed appropriate
- Observation of differential pressure across ground water filters, and replacement of filters based on the differential pressure
- Observation of differential pressure across the air stripper tower air filter, and cleaning or replacement of filter elements based on the differential pressure
- Observation of temperature and pressure in air stripping tower.
- Addition of sequesterant to the sequesterant feed tank.

Ground water filters are changed when the observed differential pressure across the filters exceeds 5 pounds per square inch, and air filter elements are cleaned or changed when the observed differential pressure across the filter exceeds 2 inches of water. A visual inspection of the oil/water separator is performed once per quarter and a visual inspection of the treatment system pipes and hoses is performed on a semi-annual basis. Critical safety devices are also checked on a semi-annual basis. A sample copy of a log sheet for operations and maintenance activities is included in Appendix D.

7.2 Monthly Gauging and Product Bailing of Selected Monitoring Wells

Ground water monitoring wells B-2, B-3A, B-4, and HA-8 are monitored on a monthly basis for the presence of LPH. Depth to product is measured using an interface probe which emits a solid tone in the presence of LPH and an intermittent tone in the present of water. If LPH is detected, the LPH is removed from the monitoring well using a disposable bailer. Recovered LPH is transferred to the product recovery drum for the GETS.

7.3 Storm Water and Spill Prevention Controls

The GETS equipment compound is a poured concrete pad with a 6-inch poured concrete berm around the pad as secondary containment. A conductivity sensor located in the northwest corner of the secondary containment shuts down the GETS if the level of water in the secondary containment exceeds one-half inch. The equipment compound has a roof covering the secondary containment to limit intrusion of storm water.

7.4 Ground Water Monitoring and Sampling Plan

Ground water monitoring and sampling of the ExxonMobil well network is currently performed on a semi-annual basis, and is coordinated with the ConocoPhillips semi-annual ground water monitoring and sampling events. During 2008, the ExxonMobil well network consisted of monitoring wells B-1, B-2, B-3A, B-4, B-5, B-6, D-4 through D-7, HA-1 through HA-14, and W-1 through W-4 (**Figure 2**). Ground water samples are submitted for analysis of the following parameters:

- TPHg, TPHd, and TPHo by Northwest Total Petroleum Hydrocarbon Methods NWTPH-Gx and NWTPH-Dx.

- BTEX, MTBE, and ethanol by United States Environmental Protection Agency (EPA) Method 8260B.

With the removal of monitoring wells W-3 and W-4 during the reconstruction of Trench 2 during November and December 2008, sampling of recovery well R-2A is proposed as a replacement. Therefore, the proposed plan includes semi-annual monitoring and sampling of monitoring wells B-1, B-2, B-3A, B-4, B-5, B-6, D-4 through D-7, HA-1 through HA-14, W-1 and W-2, and semi-annual sampling of recovery well R-2A. The GETS is shut down the day preceding ground water monitoring to allow stabilization of ground water elevations.

7.5 Compliance Monitoring Plan

The discharge permit for the sanitary sewer (King County Major Discharge Authorization #264-03) requires recording monthly flow totals and collecting semiannual compliance samples. The compliance samples are analyzed for BTEX by EPA Method 8260B and for non-polar fats, oils, and grease by EPA Method 1664. Semiannual self-monitoring reports must be submitted to the King County Industrial Waste Program no later than January 15 and July 15 of each year. **Table 4** summarizes compliance data reported to King County since the first half of 2007, following the system upgrades performed in late 2006.

7.6 Health and Safety Plan

The site-specific Health and Safety Plan is included in this work plan as Appendix E.

7.7 Sampling and Analysis Plan

Procedures for ground water monitoring and sampling and remediation system compliance sampling are in Appendix F.

8. REMARKS

This work plan represents our professional opinions, which are based in part on client-supplied and currently available information and are arrived at in accordance with accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended. This work plan was prepared solely for the use of our client. Any reliance on the information contained in the work plan by third parties shall be at such parties' sole risk.

9. REFERENCES

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TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-1	1/27/1993	18.62	5.55		13.07	
	3/12/1993	18.62	6.64		11.98	
	4/14/1993	18.62	5.65		12.97	
	6/30/1993	18.62	6.81		11.81	
	12/15/1993	18.62	7.82		10.80	
	11/4/1994	18.62	8.80		9.82	
	2/22/1995	18.62	4.54		14.08	
	5/15/1995	18.62	6.25		12.37	
	6/16/1995	18.62	7.00		11.62	
	10/20/1995	18.62	7.75		10.87	
	4/4/1996	18.62	5.13		13.49	
	4/16/1996	18.62	4.93		13.69	
	5/10/1996	18.62	4.73		13.89	
	5/15/1996	18.62	4.73		13.89	
	5/22/1996	18.62	5.03		13.59	
	6/5/1996	18.62	5.88		12.74	
	6/24/1996	18.62	6.80		11.82	
	7/15/1996	18.62	7.48		11.14	
	1/3/1997	18.62	3.55		15.07	
	3/12/1997	18.62	4.62		14.00	
	4/2/1997	18.62	4.93		13.69	
	5/1/1997	18.62	5.52		13.10	
	8/19/1997	18.62	7.51		11.11	
	9/17/1997	18.62	6.80		11.82	
	5/1/1998	18.62	6.42		12.20	
	5/23/2000	18.62	6.53		12.09	
	5/24/2001	18.62	6.65		11.97	
	6/5/2002	18.62	6.52		12.10	
	5/29/2003	18.62	6.81		11.81	
	6/15/2004	18.62	7.43		11.19	
	6/20/2005	18.62	6.43		12.19	
	6/5/2006	18.62	6.13		12.49	
	10/23/2006	18.62	7.86		10.76	
	3/14/2007	21.61	5.00		16.61	
	9/10/2007	21.61	8.00		13.61	
	6/2/2008	21.61	7.17		14.44	
	8/25/2008	21.61	7.95		13.66	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-2	1/27/1993	18.60	6.20	1.08	13.19	Used LPH density 0.73
	3/12/1993	18.60	8.15	0.24	10.63	Used LPH density 0.73
	4/14/1993	18.60	8.82	1.25	10.69	Used LPH density 0.73
	6/30/1993	18.60	8.47	0.75	10.68	Used LPH density 0.73
	12/15/1993	18.60	8.62	0.21	10.13	Used LPH density 0.73
	2/8/1994	18.60	6.63	0.50	12.34	Used LPH density 0.73
	7/8/1994	18.60	8.95		9.65	
	8/12/1994	18.60	9.34		9.26	
	9/21/1994	18.60	9.70	0.10	8.97	Used LPH density 0.73
	11/4/1994	18.60	9.68	0.12	9.01	Used LPH density 0.73
	12/23/1994	18.60	5.18		13.42	
	2/3/1995	18.60	NM	NM	NM	
	2/22/1995	18.60	6.03	0.03	12.59	Used LPH density 0.73
	5/15/1995	18.60	6.46	0.04	12.17	Used LPH density 0.73
	6/16/1995	18.60	6.92		11.68	
	10/20/1995	18.60	8.10		10.50	
	4/4/1996	18.60	5.40	0.83	13.81	Used LPH density 0.73
	4/16/1996	18.60	4.80		13.80	
	5/10/1996	18.60	4.88	0.43	14.03	Used LPH density 0.73
	5/15/1996	18.60	4.85	0.42	14.06	Used LPH density 0.73
	5/22/1996	18.60	7.14	0.05	11.50	Used LPH density 0.73
	6/5/1996	18.60	5.62		12.98	
	6/24/1996	18.60	8.17		10.43	
	7/15/1996	18.60	8.65		9.95	
	8/23/1996	18.60	9.08		9.52	
	9/18/1996	18.60	9.33		9.27	
	1/3/1997	18.60	3.91		14.69	
	3/12/1997	18.60	7.05		11.55	
	4/2/1997	18.60	7.15		11.45	
	5/1/1997	18.60	7.49		11.11	
	7/8/1997	18.60	6.03	0.02	12.58	Used LPH density 0.73
	8/19/1997	18.60	8.43		10.17	
	8/26/1997	18.60	8.52		10.08	
	9/18/1997	18.60	7.70		10.90	
	4/29/1998	18.60	6.47		12.13	
	7/30/1999	18.60	7.00		11.60	
	5/23/2000	18.60	6.67		11.93	
	5/24/2001	18.60	8.24	0.14	10.46	Used LPH density 0.73
	6/5/2002	18.60	6.56	0.31	12.27	Used LPH density 0.73
	5/29/2003	18.60	7.75		10.85	
	6/15/2004	18.60	8.76		9.84	
	6/20/2005	18.60	6.34	0.29	12.47	Used LPH density 0.73
	6/5/2006	18.60	8.87	0.02	9.74	Used LPH density 0.73
	10/23/2006	18.60	8.15		10.45	
	3/14/2007	21.82	5.23		16.59	
	9/10/2007	21.82	9.31		12.51	
	6/2/2008	21.82	8.47		13.35	
	8/25/2008	21.82	8.85		12.97	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-3	1/27/1993	18.73	10.18	4.64	11.94	Used LPH density 0.73
	3/12/1993	18.73	11.64	3.49	9.64	Used LPH density 0.73
	4/14/1993	18.73	10.75	2.64	9.91	Used LPH density 0.73
	6/30/1993	18.73	11.21	2.36	9.24	Used LPH density 0.73
	12/15/1993	18.73	11.05	0.68	8.18	Used LPH density 0.73
	2/8/1994	18.73	11.48	4.07	10.22	Used LPH density 0.73
	7/8/1994	18.73	11.58	2.37	8.88	Used LPH density 0.73
	8/12/1994	18.73	11.55	1.70	8.42	Used LPH density 0.73
	9/21/1994	18.73	11.60	0.82	NM	Used LPH density 0.73
	11/4/1994	18.73	11.60	1.20	NM	Used LPH density 0.73
	12/23/1994	18.73	11.95	6.00	11.16	Used LPH density 0.73
	2/3/1995	18.73	5.00	0.05	13.77	Used LPH density 0.73
	2/22/1995	18.73	13.68	8.63	11.35	Used LPH density 0.73
	3/24/1995	18.73	11.60	6.30	11.73	Used LPH density 0.73
	4/27/1995	18.73	9.90	3.70	11.53	Used LPH density 0.73
	5/15/1995	18.73	11.46	5.06	10.96	Used LPH density 0.73
	6/16/1995	18.73	11.48	4.53	10.56	Used LPH density 0.73
	8/25/1995	18.73	11.47	3.44	9.77	Used LPH density 0.73
	10/20/1995	18.73	9.91	0.55	9.22	Used LPH density 0.73
	4/4/1996	18.73	11.12	6.34	12.24	Used LPH density 0.73
	4/16/1996	18.73	10.04	5.28	12.54	Used LPH density 0.73
	5/10/1996	18.73	7.49	3.09	13.50	Used LPH density 0.73
	5/15/1996	18.73	6.93	2.52	13.64	Used LPH density 0.73
	5/22/1996	18.73	7.69	0.44	11.36	Used LPH density 0.73
	6/5/1996	18.73	9.31	1.54	10.54	Used LPH density 0.73
	6/24/1996	18.73	11.78	3.35	9.40	Used LPH density 0.73
	7/15/1996	18.73	11.59	2.77	9.16	Used LPH density 0.73
	8/23/1996	18.73	11.66	2.11	8.61	Used LPH density 0.73
	9/18/1996	18.73	11.63	1.96	8.53	Used LPH density 0.73
	1/3/1997	18.73	5.00	0.45	14.06	Used LPH density 0.73
	3/12/1997	18.73	8.15	0.61	11.03	Used LPH density 0.73
	4/2/1997	18.73	7.62		11.11	
	5/1/1997	18.73	7.93	1.20	11.68	Used LPH density 0.73
	7/8/1997	18.73	11.00	5.02	11.39	Used LPH density 0.73
	8/19/1997	18.73	11.12	2.52	9.45	Used LPH density 0.73
	8/26/1997	18.73	11.57	2.77	9.18	Used LPH density 0.73
	9/18/1997	18.73	10.28	0.37	8.72	Used LPH density 0.73
	4/30/1998	18.73	11.59	5.56	11.20	Used LPH density 0.73
	7/28/1999	18.73	11.63	4.77	10.58	Used LPH density 0.73
	5/23/2000	18.73	10.63	3.73	10.82	Used LPH density 0.73
	5/24/2001	18.73	10.81	2.00	9.38	Used LPH density 0.73
	6/5/2002	18.73	11.45	5.48	11.28	Used LPH density 0.73
	5/27/2003	18.73	11.42	3.55	9.90	Used LPH density 0.73
	6/15/2004	18.73	11.50	2.35	8.95	Used LPH density 0.73
	6/20/2005	18.73	9.30	3.52	12.00	Used LPH density 0.73
	6/5/2006	18.73	5.82	0.02	12.92	Used LPH density 0.73
	10/23/2006	18.73	9.05	0.91	10.34	Used LPH density 0.73
	3/14/2007	21.77	5.56	0.08	16.27	Used LPH density 0.73
	9/10/2007	21.77	10.21	0.08	11.62	Used LPH density 0.73
B-3A	6/2/2008	21.85	8.62		13.23	
	8/25/2008	21.85	8.93		12.92	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-4	1/27/1993	18.09	5.16	0.59	13.36	Used LPH density 0.73
	3/12/1993	18.09	7.48	0.03	10.63	Used LPH density 0.73
	4/14/1993	18.09	7.23	0.07	10.91	Used LPH density 0.73
	6/30/1993	18.09	7.20		10.89	
	12/15/1993	18.09	8.01	0.30	10.30	Used LPH density 0.73
	2/8/1994	18.09	6.29	0.78	12.37	Used LPH density 0.73
	7/8/1994	18.09	8.42		9.67	
	8/12/1994	18.09	8.79		9.30	
	9/21/1994	18.09	9.07		9.02	
	11/4/1994	18.09	8.94		9.15	
	12/23/1994	18.09	4.69	0.34	13.65	Used LPH density 0.73
	2/3/1995	18.09	5.00	0.90	13.75	Used LPH density 0.73
	2/22/1995	18.09	5.77	0.64	12.79	Used LPH density 0.73
	3/24/1995	18.09	6.09	0.90	12.66	Used LPH density 0.73
	4/27/1995	18.09	6.00	0.50	12.46	Used LPH density 0.73
	5/15/1995	18.09	6.24	0.44	12.17	Used LPH density 0.73
	6/16/1995	18.09	6.42	0.03	11.69	Used LPH density 0.73
	8/25/1995	18.09	7.14		10.95	
	10/20/1995	18.09	7.12		10.97	
	4/4/1996	18.09	5.03		13.06	
	4/16/1996	18.09	4.75	0.49	13.70	Used LPH density 0.73
	5/10/1996	18.09	4.71	0.92	14.05	Used LPH density 0.73
	5/15/1996	18.09	4.61	0.87	14.12	Used LPH density 0.73
	5/22/1996	18.09	7.10	0.68	11.49	Used LPH density 0.73
	6/5/1996	18.09	7.17	0.10	10.99	Used LPH density 0.73
	6/24/1996	18.09	7.67		10.42	
	7/15/1996	18.09	8.13		9.96	
	8/23/1996	18.09	8.59		9.50	
	9/18/1996	18.09	8.78		9.31	
	1/3/1997	18.09	4.46	1.61	14.81	Used LPH density 0.73
	3/12/1997	18.09	6.45	0.10	11.71	Used LPH density 0.73
	4/2/1997	18.09	6.54	0.01	11.56	Used LPH density 0.73
	5/1/1997	18.09	6.87		11.22	
	8/19/1997	18.09	7.87		10.22	
	8/26/1997	18.09	8.08		10.01	
	9/18/1997	18.09	7.40		10.69	
	4/30/1998	18.09	5.93	0.02	12.17	Used LPH density 0.73
	7/29/1999	18.09	6.42		11.67	
	5/23/2000	18.09	6.10		11.99	
	5/23/2001	18.09	7.46		10.63	
	6/5/2002	18.09	6.18	0.48	12.26	Used LPH density 0.73
	5/29/2003	18.09	7.10	sheen	10.99	
	6/15/2004	18.09	8.20	0.05	9.89	Used LPH density 0.73
	6/20/2005	18.09	5.95	0.48	12.49	Used LPH density 0.73
	6/5/2006	18.09	5.67	0.55	12.82	Used LPH density 0.73
	10/23/2006	18.09	7.60	0.04	10.52	Used LPH density 0.73
	3/14/2007	21.28	4.66	0.21	16.78	Used LPH density 0.73
	9/10/2007	21.28	8.78		12.50	
	6/2/2008	21.28	7.96		13.32	
	8/25/2008	21.28	8.35		12.93	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-5	1/27/1993	17.97	4.48		13.49	
	3/12/1993	17.97	7.98		9.99	
	4/14/1993	17.97	7.64		10.33	
	6/30/1993	17.97	7.03		10.94	
	12/15/1993	17.97	7.35		10.62	
	2/8/1994	17.97	5.40	0.03	12.59	Used LPH density 0.73
	7/8/1994	17.97	8.58	0.05	9.43	Used LPH density 0.73
	8/12/1994	17.97	8.78	0.01	9.20	Used LPH density 0.73
	9/21/1994	17.97	9.02	0.06	8.99	Used LPH density 0.73
	11/4/1994	17.97	8.96	0.07	9.06	Used LPH density 0.73
	12/23/1994	17.97	4.23	0.01	13.75	Used LPH density 0.73
	2/3/1995	17.97	4.30	0.04	13.70	Used LPH density 0.73
	2/22/1995	17.97	5.74	0.34	12.48	Used LPH density 0.73
	3/24/1995	17.97	5.93	0.78	12.61	Used LPH density 0.73
	4/27/1995	17.97	6.00	0.90	12.63	Used LPH density 0.73
	5/15/1995	17.97	6.30	0.90	12.33	Used LPH density 0.73
	6/16/1995	17.97	6.73	0.84	11.85	Used LPH density 0.73
	8/25/1995	17.97	6.87	0.07	11.15	Used LPH density 0.73
	10/20/1995	17.97	7.39		10.58	
	4/4/1996	17.97	4.24		13.73	
	4/16/1996	17.97	3.85		14.12	
	5/10/1996	17.97	3.63		14.34	
	5/15/1996	17.97	3.60		14.37	
	5/22/1996	17.97	7.46		10.51	
	6/5/1996	17.97	7.77	0.01	10.21	Used LPH density 0.73
	6/24/1996	17.97	7.57		10.40	
	7/15/1996	17.97	8.35		9.62	
	8/23/1996	17.97	8.62		9.35	
	9/18/1996	17.97	8.75		9.22	
	1/3/1997	17.97	2.95		15.02	
	3/12/1997	17.97	7.38		10.59	
	4/2/1997	17.97	7.43		10.54	
	5/1/1997	17.97	7.68		10.29	
	8/19/1997	17.97	7.56		10.41	
	8/26/1997	17.97	7.88		10.09	
	9/17/1997	17.97	7.53		10.44	
	4/29/1998	17.97	5.61		12.36	
	7/29/1999	17.97	6.09		11.88	
	5/23/2000	17.97	5.95		12.02	
	5/23/2001	17.97	7.95		10.02	
	6/5/2002	17.97	5.27		12.70	
	5/29/2003	17.97	6.82	sheen	11.15	
	6/15/2004	17.97	7.37		10.60	
	6/22/2005	17.97	5.29		12.68	
	6/5/2006	17.97	4.91		13.06	
	10/23/2006	17.97	7.24		10.73	
	3/14/2007	20.95	4.16		16.79	
	9/10/2007	20.95	8.77		12.18	
	6/2/2008	20.95	8.21		12.74	
	8/25/2008	20.95	7.86		13.09	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
B-6	1/27/1993	17.94	6.15		11.79	
	3/12/1993	17.94	7.86		10.08	
	4/14/1993	17.94	7.89		10.05	
	6/30/1993	17.94	7.26		10.68	
	12/15/1993	17.94	7.69		10.25	
	2/8/1994	17.94	5.61		12.33	
	7/8/1994	17.94	8.52		9.42	
	8/12/1994	17.94	9.38	0.76	9.11	Used LPH density 0.73
	9/21/1994	17.94	10.08	1.37	8.86	Used LPH density 0.73
	11/4/1994	17.94	10.48	1.76	8.74	Used LPH density 0.73
	12/23/1994	17.94	4.77		13.17	
	2/3/1995	17.94	4.79	0.05	13.19	Used LPH density 0.73
	2/22/1995	17.94	5.07	0.01	12.88	Used LPH density 0.73
	3/24/1995	17.94	6.97	0.77	11.53	Used LPH density 0.73
	4/27/1995	17.94	3.65	0.10	14.36	Used LPH density 0.73
	5/15/1995	17.94	6.10	0.46	12.18	Used LPH density 0.73
	6/16/1995	17.94	6.71	0.69	11.73	Used LPH density 0.73
	8/25/1995	17.94	7.20	0.37	11.01	Used LPH density 0.73
	10/20/1995	17.94	7.54	0.18	10.53	Used LPH density 0.73
	4/4/1996	17.94	5.79	1.46	13.22	Used LPH density 0.73
	4/16/1996	17.94	5.92	2.24	13.66	Used LPH density 0.73
	5/10/1996	17.94	5.64	2.20	13.91	Used LPH density 0.73
	5/15/1996	17.94	5.72	2.33	13.92	Used LPH density 0.73
	5/17/1996	17.94	NM	NM	NM	
	5/22/1996	17.94	7.34		10.60	
	6/5/1996	17.94	8.00	0.41	10.24	Used LPH density 0.73
	6/24/1996	17.94	8.20	0.25	9.92	Used LPH density 0.73
	7/15/1996	17.94	8.77	0.59	9.60	Used LPH density 0.73
	8/23/1996	17.94	9.34	0.92	9.27	Used LPH density 0.73
	9/18/1996	17.94	9.51	0.91	9.09	Used LPH density 0.73
	1/3/1997	17.94	3.71		14.23	
	3/12/1997	17.94	7.01		10.93	
	4/2/1997	17.94	7.56		10.38	
	5/1/1997	17.94	7.65		10.29	
	8/19/1997	17.94	7.81		10.13	
	9/17/1997	17.94	7.00		10.94	
	4/29/1998	17.94	5.89		12.05	
	7/29/1999	17.94	6.15		11.79	
	5/24/2001	17.94	8.05		9.89	
	6/5/2002	17.94	5.65	0.10	12.29	Used LPH density 0.73
	5/29/2003	17.94	7.08		10.86	
	6/15/2004	17.94	8.42		9.52	
	6/22/2005	17.94	5.44		12.50	
	6/5/2006	17.94	5.10		12.84	
	10/23/2006	17.94	7.34		10.60	
	3/14/2007	21.00	4.46		16.54	
	9/10/2007	21.00	8.76		12.24	
	6/2/2008	21.00	7.99		13.01	
	8/25/2008	21.00	8.11		12.89	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
D-1	1/27/1993	18.03	5.53		12.50	
	3/12/1993	18.03	6.65		11.38	
	4/14/1993	18.03	5.84		12.19	
	12/15/1993	18.03	6.59		11.44	
	11/4/1994	18.03	7.55		10.48	
	2/22/1995	18.03	5.90		12.13	
	6/16/1995	18.03	6.86		11.17	
	10/20/1995	18.03	6.60		11.43	
	4/4/1996	18.03	6.44		11.59	
	4/16/1996	18.03	6.36		11.67	
	5/1/1997	18.03	6.06		11.97	
	ABANDONED					
D-2	11/4/1994	19.14	NM	NM	NM	
	ABANDONED					
D-4	1/27/1993	17.82	NM	NM	NM	
	12/15/1993	17.82	NM	NM	NM	
	11/4/1994	17.82	6.44		11.38	
	2/22/1995	17.82	3.95		13.87	
	6/16/1995	17.82	6.37		11.45	
	10/20/1995	17.82	6.10		11.72	
	4/4/1996	17.82	5.17		12.65	
	4/16/1996	17.82	5.40		12.42	
	4/30/1998	17.82	5.68		12.14	
	6/5/2002	17.82	DRY			
	5/27/2003	17.82	DRY			
	6/15/2004	17.82	DRY			
	6/21/2005	17.82	5.90		11.92	
	6/5/2006	17.82	4.77		13.05	
	10/23/2006	17.82	5.82		DRY	
	3/14/2007	21.09	5.30		15.79	
	9/10/2007	21.09	5.57		15.52	
	6/2/2008	21.09	DRY			
	8/25/2008	21.09	2.89		18.20	
D-5	1/27/1993	18.12	5.51		12.61	
	4/14/1993	18.12	5.58		12.54	
	12/15/1993	18.12	6.55		11.57	
	11/4/1994	18.12	6.56		11.56	
	2/22/1995	18.12	4.10		14.02	
	6/16/1995	18.12	6.77		11.35	
	10/20/1995	18.12	6.55		11.57	
	4/4/1996	18.12	4.51		13.61	
	4/16/1996	18.12	4.94		13.18	
	5/1/1997	18.12	6.50		11.62	
	4/30/1998	18.12	6.61		11.51	
	5/27/2003	18.12	DRY			
	6/15/2004	18.12	DRY			
	6/21/2005	18.12	DRY			
	6/5/2006	18.12	6.51		11.61	
	10/23/2006	18.12	DRY			
	3/14/2007	21.33	DRY			
	9/10/2007	21.33	DRY			
	6/2/2008	21.33	DRY			
	8/25/2008	21.33	6.91		14.42	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
D-6	1/27/1993	17.74	5.54	1.00	12.93	Used LPH density 0.73
	3/12/1993	17.74	6.79		10.95	
	4/14/1993	17.74	5.68		12.06	
	6/30/1993	17.74	6.58		11.16	
	12/15/1993	17.74	7.14		10.60	
	2/8/1994	17.74	5.27		12.47	
	7/8/1994	17.74	7.43		10.31	
	8/12/1994	17.74	NM	NM	NM	
	9/21/1994	17.74	NM	NM	NM	
	11/4/1994	17.74	NM	NM	NM	
	12/23/1994	17.74	5.14		12.60	
	2/3/1995	17.74	4.34		13.40	
	2/22/1995	17.74	4.79		12.95	
	3/24/1995	17.74	4.55		13.19	
	4/27/1995	17.74	6.64		11.10	
	5/15/1995	17.74	5.19		12.55	
	6/16/1995	17.74	5.67		12.07	
	8/25/1995	17.74	6.42		11.32	
	10/20/1995	17.74	4.81		12.93	
	4/4/1996	17.74	1.58		16.16	
	4/16/1996	17.74	1.21		16.53	
	5/10/1996	17.74	3.50		14.24	
	5/15/1996	17.74	3.28		14.46	
	5/22/1996	17.74	5.59		12.15	
	6/5/1996	17.74	6.09		11.65	
	6/24/1996	17.74	6.55		11.19	
	7/15/1996	17.74	7.10		10.64	
	8/23/1996	17.74	7.73		10.01	
	9/18/1996	17.74	7.09		10.65	
	1/3/1997	17.74	2.77		14.97	
	3/12/1997	17.74	1.61		16.13	
	4/2/1997	17.74	5.97		11.77	
	5/1/1997	17.74	5.89		11.85	
	8/19/1997	17.74	7.28		10.46	
	9/17/1997	17.74	7.38		10.36	
	4/30/1998	17.74	5.49		12.25	
	5/23/2000	17.74	5.82		11.92	
	5/23/2001	17.74	6.92		10.82	
	6/5/2002	17.74	4.67		13.07	
	5/27/2003	17.74	6.72		11.02	
	6/15/2004	17.74	8.52		9.22	
	6/22/2005	17.74	4.67		13.07	
	6/5/2006	17.74	2.62		15.12	
	10/23/2006	17.74	6.95		10.79	
	3/14/2007	20.61	4.62		15.99	
	9/10/2007	20.61	7.92		12.69	
	6/2/2008	20.61	6.75		13.86	
	8/25/2008	20.61	7.51		13.10	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
D-7	1/27/1993	17.69	5.07		12.62	
	3/12/1993	17.69	6.38		11.31	
	4/14/1993	17.69	6.38		11.31	
	12/15/1993	17.69	7.37		10.32	
	7/8/1994	17.69	7.14		10.55	
	8/12/1994	17.69	7.14		10.55	
	9/21/1994	17.69	NM	NM	NM	
	11/4/1994	17.69	7.94		9.75	
	12/23/1994	17.69	7.14		10.55	
	2/3/1995	17.69	4.59		13.10	
	2/22/1995	17.69	5.31		12.38	
	3/24/1995	17.69	5.35		12.34	
	4/27/1995	17.69	5.18		12.51	
	5/15/1995	17.69	5.50		12.19	
	6/16/1995	17.69	5.95		11.74	
	8/25/1995	17.69	6.59		11.10	
	10/20/1995	17.69	6.00		11.69	
	3/24/1996	17.69	5.35		12.34	
	4/4/1996	17.69	4.30		13.39	
	4/16/1996	17.69	4.01		13.68	
	4/2/1997	17.69	6.04		11.65	
	5/1/1997	17.69	6.30		11.39	
	9/17/1997	17.69				
	4/30/1998	17.69	5.85		11.84	
	5/23/2000	17.69	6.11		11.58	
	5/23/2001	17.69	6.85		10.84	
	6/4/2002	17.69	5.51		12.18	
	5/27/2003	17.69	6.36		11.33	
	6/15/2004	17.69	7.24		10.45	
	6/22/2005	17.69	5.11		12.58	
	6/5/2006	17.69	4.74		12.95	
	10/23/2006	17.69	7.04		10.65	
	3/14/2007	20.49	3.83		16.66	
	9/10/2007	20.49	7.67		12.82	
	6/2/2008	20.49	6.25		14.24	
	8/25/2008	20.49	7.42		13.07	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-1	1/27/1993	19.50	5.94		13.56	
	3/12/1993	19.50	8.54		10.96	
	4/14/1993	19.50	6.47		13.03	
	12/15/1993	19.50	5.54		13.96	
	11/4/1994	19.50	10.30		9.20	
	2/22/1995	19.50	5.11		14.39	
	6/16/1995	19.50	8.33		11.17	
	10/20/1995	19.50	5.48		14.02	
	4/4/1996	19.50	5.81		13.69	
	4/16/1996	19.50	5.78		13.72	
	5/1/1997	19.50	5.59		13.91	
	9/17/1997	19.50	5.50		14.00	
	4/29/1998	19.50	5.83		13.67	
	7/28/1999	19.50	NM	NM	NM	
	5/24/2000	19.50	6.20		13.30	
	5/23/2001	19.50	6.30		13.20	
	6/4/2002	19.50	6.40		13.10	
	5/28/2003	19.50	6.45		13.05	
	6/15/2004	19.50	5.80		13.70	
	6/22/2005	19.50	5.77		13.73	
	6/5/2006	19.50	5.00		14.50	
	10/23/2006	19.50	5.97		13.53	
	3/14/2007	20.76	3.42		17.34	
	9/10/2007	20.76	4.46		16.30	
	6/2/2008	20.76	4.83		15.93	
	8/25/2008	20.76	3.33		17.43	
HA-2	1/27/1993	18.17	5.80		12.37	
	3/12/1993	18.17	NM	NM	NM	
	4/14/1993	18.17	7.12		11.05	
	12/15/1993	18.17	7.84		10.33	
	11/4/1994	18.17	8.45		9.72	
	2/22/1995	18.17	6.39		11.78	
	6/16/1995	18.17	7.03		11.14	
	10/20/1995	18.17	7.29		10.88	
	4/4/1996	18.17	5.43		12.74	
	4/16/1996	18.17	5.17		13.00	
	4/2/1997	18.17	6.80		11.37	
	5/1/1997	18.17	6.98		11.19	
	9/18/1997	18.17	7.34		10.83	
	4/30/1998	18.17	6.74		11.43	
	7/30/1999	18.17	7.03		11.14	
	5/23/2000	18.17	6.94		11.23	
	5/23/2001	18.17	7.50		10.67	
	6/4/2002	18.17	6.45		11.72	
	5/27/2003	18.17	7.40	sheen	10.77	
	6/16/2004	18.17	7.84		10.33	
	6/21/2005	18.17	6.41		11.76	
	6/5/2006	18.17	6.22		11.95	
	10/23/2006	18.17	7.84		10.33	
	3/14/2007	21.09	5.69		15.40	
	9/10/2007	21.09	7.89		13.20	
	6/2/2008	21.09	7.12		13.97	
	8/25/2008	21.09	7.77		13.32	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-3	1/27/1993	21.03	8.65		12.38	
	3/12/1993	21.03	9.01		12.02	
	4/14/1993	21.03	8.61		12.42	
	12/15/1993	21.03	9.22		11.81	
	11/4/1994	21.03	10.26		10.77	
	2/22/1995	21.03	8.35		12.68	
	6/16/1995	21.03	9.31		11.72	
	10/20/1995	21.03	9.46		11.57	
	4/4/1996	21.03	7.95		13.08	
	4/16/1996	21.03	8.10		12.93	
	4/2/1997	21.03	6.70		14.33	
	5/1/1997	21.03	8.44		12.59	
	9/18/1997	21.03	9.34		11.69	
	4/30/1998	21.03	9.20		11.83	
	5/23/2000	21.03	9.25		11.78	
	5/23/2001	21.03	9.18		11.85	
	6/4/2002	21.03	9.07		11.96	
	5/27/2003	21.03	9.30		11.73	
	DRY	21.03	--		--	
	6/22/2005	21.03	8.94		12.09	
	6/5/2006	21.03	8.91		12.12	
	10/23/2006	21.03	9.66		11.37	
	3/14/2007	21.09	5.42		15.67	
	9/10/2007	21.09	6.70		14.39	
	6/2/2008	21.09	6.36		14.73	
	8/25/2008	21.09	6.30		14.79	
HA-4	1/27/1993	20.24	7.68		12.56	
	3/12/1993	20.24	8.56		11.68	
	4/14/1993	20.24	8.02		12.22	
	12/15/1993	20.24	8.41		11.83	
	11/4/1994	20.24	10.14		10.10	
	2/22/1995	20.24	7.09		13.15	
	6/16/1995	20.24	8.78		11.46	
	10/20/1995	20.24	8.54		11.70	
	4/4/1996	20.24	7.68		12.56	
	4/16/1996	20.24	7.11		13.13	
	4/2/1997	20.24	8.00		12.24	
	5/1/1997	20.24	5.49		14.75	
	9/18/1997	20.24	7.70		12.54	
	4/30/1998	20.24	8.67		11.57	
	5/23/2000	20.24	7.35		12.89	
	5/23/2001	20.24	8.95		11.29	
	6/4/2002	20.24	6.45		13.79	
	5/27/2003	20.24	8.64		11.60	
	6/16/2004	20.24	8.67		11.57	
	6/22/2005	20.24	8.58		11.66	
	6/5/2006	20.24	8.04		12.20	
	10/23/2006	20.24	9.00		11.24	
	3/14/2007	21.05	5.06		15.99	
	9/10/2007	21.05	6.77		14.28	
	6/2/2008	21.05	6.37		14.68	
	8/25/2008	21.05	4.15		16.90	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-5	1/27/1993	18.07	4.50		13.57	
	3/12/1993	18.07	6.22		11.85	
	4/14/1993	18.07	5.13		12.94	
	12/15/1993	18.07	6.39		11.68	
	11/4/1994	18.07	7.86		10.21	
	2/22/1995	18.07	3.67		14.40	
	6/16/1995	18.07	6.70		11.37	
	10/20/1995	18.07	6.41		11.66	
	4/4/1996	18.07	4.88		13.19	
	4/16/1996	18.07	4.91		13.16	
	5/1/1997	18.07	5.04		13.03	
	9/18/1997	18.07	5.90		12.17	
	5/1/1998	18.07	5.98		12.09	
	7/29/1999	18.07	6.53		11.54	
	5/23/2000	18.07	6.22		11.85	
	5/22/2001	18.07	6.09		11.98	
	6/5/2002	18.07	6.08		11.99	
	5/28/2003	18.07	6.83		11.24	
	6/16/2004	18.07	7.01		11.06	
	6/20/2005	18.07	5.82		12.25	
	6/5/2006	18.07	5.42		12.65	
	10/23/2006	18.07	7.54		10.53	
	3/14/2007	21.13	4.38		16.75	
	9/10/2007	21.13	8.26		12.87	
	6/2/2008	21.13	7.04		14.09	
	8/25/2008	21.13	7.65		13.48	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-6	1/27/1993	18.16	4.58		13.58	
	3/12/1993	18.16	6.46		11.70	
	4/14/1993	18.16	5.55		12.61	
	12/15/1993	18.16	7.15		11.01	
	11/4/1994	18.16	8.42		9.74	
	2/22/1995	18.16	4.98		13.18	
	5/15/1995	18.16	5.86		12.30	
	6/16/1995	18.16	6.62		11.54	
	10/20/1995	18.16	6.86		11.30	
	4/4/1996	18.16	4.68		13.48	
	4/16/1996	18.16	4.60		13.56	
	5/10/1996	18.16	4.20		13.96	
	5/15/1996	18.16	4.02		14.14	
	5/22/1996	18.16	4.97		13.19	
	6/5/1996	18.16	5.79		12.37	
	6/24/1996	18.16	6.78		11.38	
	7/15/1996	18.16	7.51		10.65	
	8/23/1996	18.16	8.09		10.07	
	9/18/1996	18.16	8.37		9.79	
	1/3/1997	18.16	2.84		15.32	
	3/12/1997	18.16	4.54		13.62	
	4/2/1997	18.16	4.85		13.31	
	5/1/1997	18.16	5.35		12.81	
	8/19/1997	18.16	7.40		10.76	
	8/26/1997	18.16	7.60		10.56	
	9/17/1997	18.16	6.44		11.72	
	5/1/1998	18.16	5.95		12.21	
	7/30/1999	18.16	6.54		11.62	
	5/22/2000	18.16	6.21		11.95	
	5/22/2001	18.16	6.36		11.80	
	6/5/2002	18.16	6.00		12.16	
	5/28/2003	18.16	6.93	sheen	11.23	
	6/16/2004	18.16	7.45		10.71	
	6/20/2005	18.16	5.76		12.40	
	6/5/2006	18.16	5.39		12.77	
	10/23/2006	18.16	7.72		10.44	
	3/14/2007	21.43	4.37		17.06	
	9/10/2007	21.43	8.48		12.95	
	6/2/2008	21.43	7.24		14.19	
	8/25/2008	21.43	8.00		13.43	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-7	1/27/1993	18.44	6.33	2.22	13.73	Used LPH density 0.73
	3/12/1993	18.44	7.30	0.61	11.59	Used LPH density 0.73
	4/14/1993	18.44	7.00	1.23	12.34	Used LPH density 0.73
	6/30/1993	18.44	7.36	0.84	11.69	Used LPH density 0.73
	12/15/99	18.44	7.80	0.55	11.04	Used LPH density 0.73
	2/8/1994	18.44	6.14	0.50	12.67	Used LPH density 0.73
	8/12/1994	18.44	9.09	0.53	9.74	Used LPH density 0.73
	9/21/1994	18.44	9.39	0.47	9.39	Used LPH density 0.73
	11/4/1994	18.44	9.15	0.51	9.66	Used LPH density 0.73
	12/23/1994	18.44	4.07	0.19	14.51	Used LPH density 0.73
	2/3/1995	18.44	3.94	0.40	14.79	Used LPH density 0.73
	2/22/1995	18.44	4.75	0.48	14.04	Used LPH density 0.73
	3/24/1995	18.44	5.30	0.45	13.47	Used LPH density 0.73
	4/27/1995	18.44	5.85	0.50	12.96	Used LPH density 0.73
	5/15/1995	18.44	6.44	0.55	12.40	Used LPH density 0.73
	6/16/1995	18.44	7.16	0.58	11.70	Used LPH density 0.73
	8/25/1995	18.44	7.72	0.42	11.03	Used LPH density 0.73
	10/20/1995	18.44	7.45	0.40	11.28	Used LPH density 0.73
	4/4/1996	18.44	5.38	0.63	13.52	Used LPH density 0.73
	4/16/1996	18.44	5.17	0.62	13.72	Used LPH density 0.73
	5/10/1996	18.44	4.89	0.64	14.02	Used LPH density 0.73
	5/15/1996	18.44	4.62	0.63	14.28	Used LPH density 0.73
	5/22/1996	18.44	6.35	0.86	12.72	Used LPH density 0.73
	6/5/1996	18.44	6.92	0.72	12.05	Used LPH density 0.73
	6/24/1996	18.44	7.72	0.67	11.21	Used LPH density 0.73
	7/15/1996	18.44	8.32	0.57	10.54	Used LPH density 0.73
	8/23/1996	18.44	8.90	0.55	9.94	Used LPH density 0.73
	9/18/1996	18.44	9.19	0.57	9.67	Used LPH density 0.73
	1/3/1997	18.44	3.67	0.66	15.25	Used LPH density 0.73
	3/12/1997	18.44	5.86	0.83	13.19	Used LPH density 0.73
	4/2/1997	18.44	6.17	0.78	12.84	Used LPH density 0.73
	5/1/1997	18.44	6.58	0.83	12.47	Used LPH density 0.73
	7/8/1997	18.44	5.67	0.06	12.81	Used LPH density 0.73
	8/19/1997	18.44	7.62		10.82	
	8/26/1997	18.44	7.93	0.05	10.55	Used LPH density 0.73
	9/18/1997	18.44	8.70	0.06	9.78	Used LPH density 0.73
	4/30/1998	18.44	6.07	0.08	12.43	Used LPH density 0.73
	7/29/1999	18.44	6.82		11.62	
	5/22/2000	18.44	6.18		12.26	
	5/22/2001	18.44	6.74		11.70	
	6/5/2002	18.44	6.11		12.33	
	5/28/2003	18.44	7.08	sheen	11.36	
	6/15/2004	18.44	7.83		10.61	
	6/20/2005	18.44	5.71		12.73	
	6/5/2006	18.44	5.28		13.16	
	10/23/2006	18.44	7.86		10.58	
	3/14/2007	21.60	4.47		17.13	
	9/10/2007	21.60	8.78		12.82	
	6/2/2008	21.60	7.62		13.98	
	8/25/2008	21.60	8.27		13.33	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-8	1/27/1993	18.88	4.60		14.28	
	3/12/1993	18.88	6.79		12.09	
	4/14/1993	18.88	5.20		13.68	
	12/15/1993	18.88	7.18		11.70	
	11/4/1994	18.88	8.85		10.03	
	2/22/1995	18.88	4.03		14.85	
	6/16/1995	18.88	7.13		11.75	
	10/20/1995	18.88	7.09		11.79	
	4/4/1996	18.88	5.32		13.56	
	4/16/1996	18.88	5.18		13.70	
	5/1/1997	18.88	5.01		13.87	
	8/26/1997	18.88	7.99		10.89	
	9/18/1997	18.88	6.90		11.98	
	5/1/1998	18.88	6.25		12.63	
	7/29/1999	18.88	7.93		10.95	
	5/22/2000	18.88	6.10		12.78	
	5/22/2001	18.88	6.65		12.23	
	6/5/2002	18.88	6.54		12.34	
	5/28/2003	18.88	7.30		11.58	
	6/15/2004	18.88	8.21	0.51	11.04	Used LPH density 0.73
	6/20/2005	18.88	6.27	0.11	12.69	Used LPH density 0.73
	6/5/2006	18.88	5.38	0.06	13.54	Used LPH density 0.73
	10/23/2006	18.88	8.26	0.02	10.63	Used LPH density 0.73
	3/14/2007	21.97	4.24	0.02	17.75	Used LPH density 0.73
	9/10/2007	21.97	8.96		13.01	
	6/2/2008	21.97	7.64		14.33	
	8/25/2008	21.97	8.34		13.63	
HA-9	1/27/1993	19.40	7.00		12.40	
	3/12/1993	19.40	7.95		11.45	
	4/14/1993	19.40	7.74		11.66	
	12/15/1993	19.40	7.82		11.58	
	11/4/1994	19.40	9.75		9.65	
	2/22/1995	19.40	7.61		11.79	
	6/16/1995	19.40	8.17		11.23	
	10/20/1995	19.40	8.08		11.32	
	4/4/1996	19.40	7.30		12.10	
	4/16/1996	19.40	7.28		12.12	
	4/2/1997	19.40	7.76		11.64	
	5/1/1997	19.40	7.78		11.62	
	9/18/1997	19.40	7.95		11.45	
	4/29/1998	19.40	7.99		11.41	
	7/28/1999	19.40	8.23		11.17	
	5/24/2000	19.40	9.25		10.15	
	5/23/2001	19.40	7.92		11.48	
	6/4/2002	19.40	8.01		11.39	
	5/28/2003	19.40	8.05	sheen	11.35	
	6/17/2004	19.40	8.18		11.22	
	6/20/2005	19.40	7.98		11.42	
	6/5/2006	19.40	7.62		11.78	
	10/23/2006	19.40	8.32		11.08	
	3/14/2007	21.32	6.08		15.24	
	9/10/2007	21.32	7.13		14.19	
	6/2/2008	21.32	6.90		14.42	
	8/25/2008	21.32	7.08		14.24	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-10	1/27/1993	19.40	6.88		12.45	
	3/12/1993	19.40	8.94		10.39	
	4/14/1993	19.40	8.73		10.60	
	12/15/1993	19.40	8.05		11.28	
	11/4/1994	19.40	NM	NM	NM	
	2/22/1995	19.40	8.14		11.19	
	6/16/1995	19.40	9.18		10.15	
	10/20/1995	19.40	7.83		11.50	
	4/4/1996	19.40	7.67		11.66	
	4/16/1996	19.40	7.29		12.04	
	7/15/1996	19.40	9.40		9.93	
	4/2/1997	19.40	8.74		10.59	
	5/1/1997	19.40	8.26		11.07	
	5/23/2001	19.40	8.86		10.47	
	6/6/2002	19.40	9.80		9.53	
	5/27/2003	19.40	9.31		10.02	
	6/17/2004	19.40	9.17		10.16	
	6/21/2005	19.40	8.58		10.75	
	6/5/2006	19.40	7.84		11.49	
	10/23/2006	19.40	9.09		10.24	
	3/14/2007	21.15	6.21		14.94	
	9/10/2007	21.15	8.20		12.95	
	6/2/2008	21.15	7.85		13.30	
	8/25/2008	21.15	6.51		14.64	
HA-11	1/27/1993	18.51	5.80		12.71	
	3/12/1993	18.51	7.97		10.54	
	4/14/1993	18.51	7.33		11.18	
	12/15/1993	18.51	7.18		11.33	
	11/4/1994	18.51	9.77		8.74	
	2/22/1995	18.51	7.49		11.02	
	6/16/1995	18.51	8.25		10.26	
	10/20/1995	18.51	7.62		10.89	
	4/4/1996	18.51	6.95		11.56	
	4/16/1996	18.51	6.60		11.91	
	4/2/1997	18.51	7.95		10.56	
	5/1/1997	18.51	7.96		10.55	
	4/29/1998	18.51	7.89		10.62	
	7/28/1999	18.51	8.08		10.43	
	5/24/2000	18.51	7.75		10.76	
	5/23/2001	18.51	8.40		10.11	
	6/4/2002	18.51	7.77		10.74	
	5/27/2003	18.51	8.33		10.18	
	DRY	18.51	--		--	
	6/21/2005	18.51	7.85		10.66	
	6/5/2006	18.51	7.57		10.49	
	10/23/2006	18.51	8.60		9.91	
	3/14/2007	20.69	6.21		14.48	
	9/10/2007	20.69	8.18		12.51	
	6/2/2008	20.69	7.58		13.11	
	8/25/2008	20.69	8.09		12.60	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-12	1/27/1993	19.91	4.01		15.90	
	3/12/1993	19.91	7.36		12.55	
	4/14/1993	19.91	5.92		13.99	
	12/15/1993	19.91	7.02		12.89	
	11/4/1994	19.91	9.06		10.85	
	2/22/1995	19.91	3.80		16.11	
	6/16/1995	19.91	7.40		12.51	
	10/20/1995	19.91	7.40		12.51	
	4/4/1996	19.91	5.65		14.26	
	4/16/1996	19.91	5.26		14.65	
	5/1/1997	19.91	6.13		13.78	
	8/26/1997	19.91	8.58		11.33	
	9/18/1997	19.91	8.70		11.21	
	5/1/1998	19.91	6.65		13.26	
	7/29/1999	19.91	7.46		12.45	
	5/22/2000	19.91	7.63		12.28	
	5/22/2001	19.91	7.29		12.62	
	6/5/2002	19.91	7.06		12.85	
	5/28/2003	19.91	7.84		12.07	
	6/16/2004	19.91	8.43		11.48	
	6/21/2005	19.91	6.67		13.24	
	6/5/2006	19.91	5.91		14.00	
	10/23/2006	19.91	8.71		11.20	
	3/14/2007	22.47	5.11		17.36	
	9/10/2007	22.47	9.38		13.09	
	6/2/2008	22.47	8.14		14.33	
	8/25/2008	22.47	8.67		13.80	
HA-13	1/27/1993	19.56	5.32		14.24	
	3/12/1993	19.56	8.23		11.33	
	4/14/1993	19.56	7.08		12.48	
	12/15/1993	19.56	6.34		13.22	
	11/4/1994	19.56	8.93		10.63	
	2/22/1995	19.56	4.54		15.02	
	6/16/1995	19.56	8.83		10.73	
	10/20/1995	19.56	8.23		11.33	
	4/4/1996	19.56	7.06		12.50	
	4/16/1996	19.56	7.31		12.25	
	5/1/1997	19.56	7.01		12.55	
	9/18/1997	19.56	6.93		12.63	
	4/30/1998	19.56	8.26		11.30	
	7/28/1999	19.56	8.62		10.94	
	5/22/2000	19.56	8.45		11.11	
	5/22/2001	19.56	8.20		11.36	
	6/4/2002	19.56	8.41		11.15	
	5/27/2003	19.56	8.89		10.67	
	6/16/2004	19.56	7.99		11.57	
	6/21/2005	19.56	8.34		11.22	
	6/5/2006	19.56	7.74		11.82	
	10/23/2006	19.56	9.45		10.11	
	3/14/2007	22.73	6.28		16.45	
	9/10/2007	22.73	9.94		12.79	
	6/2/2008	22.73	9.03		13.70	
	8/25/2008	22.73	9.29		13.44	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
HA-14	1/27/1993	20.02	6.10		13.92	
	3/12/1993	20.02	8.80		11.22	
	4/14/1993	20.02	7.04		12.98	
	12/15/1993	20.02	8.56		11.46	
	11/4/1994	20.02	8.35		11.67	
	2/22/1995	20.02	5.10		14.92	
	6/16/1995	20.02	9.51		10.51	
	10/20/1995	20.02	8.77		11.25	
	4/4/1996	20.02	7.52		12.50	
	4/16/1996	20.02	6.01		14.01	
	5/1/1997	20.02	6.92		13.10	
	9/18/1997	20.02	8.17		11.85	
	4/30/1998	20.02	9.05		10.97	
	7/29/1999	20.02	9.49		10.53	
	5/22/2000	20.02	9.22		10.80	
	5/22/2001	20.02	9.03		10.99	
	6/4/2002	20.02	8.41		11.61	
	5/27/2003	20.02	9.48		10.54	
	6/16/2004	20.02	9.69		10.33	
	6/21/2005	20.02	9.15		10.87	
	6/5/2006	20.02	7.96		12.06	
	10/23/2006	20.02	10.18		9.84	
	3/14/2007	23.47	7.13		16.34	
	9/10/2007	23.47	10.41		13.06	
	6/2/2008	23.47	9.68		13.79	
	8/25/2008	23.47	8.67		14.80	
HB-1	12/7/1993					
	DISCONTINUED SAMPLING					
HB-2	12/7/1993					
	DISCONTINUED SAMPLING					

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
R-1	1/27/1993	16.94	5.22	0.05	11.76	Used LPH density 0.73
	3/12/1993	16.94	11.80	0.10	5.21	Used LPH density 0.73
	6/30/1993	16.94	6.88	0.01	10.07	Used LPH density 0.73
	12/15/1993	16.94	NM		NM	
	2/8/1994	16.94	NM		NM	
	7/8/1994	16.94	NM		NM	
	8/12/1994	16.94	NM		NM	
	9/21/1994	16.94	NM		NM	
	11/4/1994	16.94	NM		NM	
	12/23/1994	16.94	3.43		13.51	
	2/3/1995	16.94	4.10	0.10	12.91	Used LPH density 0.73
	2/22/1995	16.94	5.28	0.13	11.75	Used LPH density 0.73
	3/24/1995	16.94	5.55	0.40	11.68	Used LPH density 0.73
	4/27/1995	16.94	5.62	0.32	11.55	Used LPH density 0.73
	5/15/1995	16.94	4.91	0.47	12.37	Used LPH density 0.73
	6/16/1995	16.94	5.29	0.44	11.97	Used LPH density 0.73
	8/25/1995	16.94	5.85	0.20	11.24	Used LPH density 0.73
	9/26/1995	16.94	7.67	0.19	9.41	Used LPH density 0.73
	10/20/1995	16.94	6.17	0.02	10.78	Used LPH density 0.73
	4/4/1996	16.94	3.82	0.15	13.23	Used LPH density 0.73
	4/16/1996	16.94	3.14	0.14	13.90	Used LPH density 0.73
	5/10/1996	16.94	2.72	0.11	14.30	Used LPH density 0.73
	5/15/1996	16.94	2.67	0.06	14.31	Used LPH density 0.73
	5/22/1996	16.94	7.83		9.11	
	6/5/1996	16.94	8.62		8.32	
	6/24/1996	16.94	8.50		8.44	
	7/15/1996	16.94	8.63		8.31	
	8/23/1996	16.94	8.53		8.41	
	9/18/1996	16.94	8.34		8.60	
	1/3/1997	16.94	3.11		13.83	
	3/12/1997	16.94	8.91		8.03	
	4/2/1997	16.94	11.04	0.05	5.94	Used LPH density 0.73
	7/8/1997	16.94	5.71		11.23	
	8/26/1997	16.94	11.02		5.92	
	9/17/1997	16.94	10.84		6.10	
	4/30/1998	16.94	4.60	0.02	12.35	Used LPH density 0.73
	5/24/2001	16.94	10.75		6.19	
	6/5/2002	16.94	NM	NM	NM	
	5/27/2003	16.94	NM	NM	NM	
	6/20/2005	16.94	NM	NM	NM	
	6/5/2006	16.94	NM	NM	NM	
	10/23/2006	16.94	NM	NM	NM	
	3/14/2007	19.83	NM	NM	NM	
	9/10/2007	19.83	NM	NM	NM	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
R-2	1/27/1993	17.52	6.15		11.37	
	3/12/1993	17.52	7.20		10.32	
	12/15/1993	17.52	NM		NM	
	11/4/1994	17.52	NM		NM	
	2/22/1995	17.52	7.66		9.86	
	5/15/1995	17.52	7.87		9.65	
	6/16/1995	17.52	7.51	0.01	10.02	Used LPH density 0.73
	9/26/1995	17.52	7.81	0.01	9.72	Used LPH density 0.73
	10/20/1995	17.52	7.63	0.06	9.93	Used LPH density 0.73
	4/4/1996	17.52	5.55		11.97	
	4/16/1996	17.52	5.29		12.23	
	5/10/1996	17.52	5.21		12.31	
	5/15/1996	17.52	5.10		12.42	
	5/22/1996	17.52	7.59	0.02	9.94	Used LPH density 0.73
	6/5/1996	17.52	7.80	0.18	9.85	Used LPH density 0.73
	6/24/1996	17.52	7.72	0.03	9.82	Used LPH density 0.73
	7/15/1996	17.52	7.60	0.04	9.95	Used LPH density 0.73
	8/23/1996	17.52	7.77	0.02	9.76	Used LPH density 0.73
	9/18/1996	17.52	7.87	0.04	9.68	Used LPH density 0.73
	1/3/1997	17.52	4.25		13.27	
	3/12/1997	17.52	8.02	0.02	9.51	Used LPH density 0.73
	4/2/1997	17.52	7.72	0.11	9.88	Used LPH density 0.73
	7/8/1997	17.52	6.47		11.05	
	8/19/1997	17.52	7.76	0.02	9.77	Used LPH density 0.73
	9/17/1997	17.52	7.67		9.85	
	4/30/1998	17.52	6.43	0.03	11.11	Used LPH density 0.73
	5/24/2001	17.52	8.25	0.35	9.53	Used LPH density 0.73
	6/5/2002	17.52	NM	NM	NM	
	5/27/2003	17.52	NM	NM	NM	
	6/20/2005	17.52	NM	NM	NM	
	6/5/2006	17.52	NM	NM	NM	
	10/23/2006	17.52	NM	NM	NM	
	3/14/2007	20.28	NM	NM	NM	
	9/10/2007	20.28	NM	NM	NM	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
W-1	1/27/1993	18.86	5.71	0.19	13.29	Used LPH density 0.73
	3/12/1993	18.86	8.24	0.06	10.66	Used LPH density 0.73
	4/14/1993	18.86	8.22		10.64	
	6/30/1993	18.86	8.25	0.08	10.67	Used LPH density 0.73
	12/15/1993	18.86	8.60		10.26	
	2/8/1994	18.86	6.51	0.13	12.44	Used LPH density 0.73
	7/8/1994	18.86	8.64		10.22	
	8/12/1994	18.86	8.63		10.23	
	9/21/1994	18.86	NM	NM	NM	
	11/4/1994	18.86	NM	NM	NM	
	12/23/1994	18.86	5.48		13.38	
	2/3/1995	18.86	5.24		13.62	
	2/22/1995	18.86	7.13	0.03	11.75	Used LPH density 0.73
	3/24/1995	18.86	7.04	0.14	11.92	Used LPH density 0.73
	4/27/1995	18.86	6.75		12.11	
	5/15/1995	18.86	6.88	0.39	12.26	Used LPH density 0.73
	6/16/1995	18.86	7.34	0.45	11.85	Used LPH density 0.73
	8/25/1995	18.86	7.89	0.18	11.10	Used LPH density 0.73
	10/20/1995	18.86	8.60	0.12	10.35	Used LPH density 0.73
	4/4/1996	18.86	5.81	0.07	13.10	Used LPH density 0.73
	4/16/1996	18.86	5.07	0.12	13.88	Used LPH density 0.73
	5/10/1996	18.86	4.75	0.09	14.18	Used LPH density 0.73
	5/15/1996	18.86	4.74	0.11	14.20	Used LPH density 0.73
	5/22/1996	18.86	8.08	0.07	10.83	Used LPH density 0.73
	6/5/1996	18.86	8.12	0.02	10.75	Used LPH density 0.73
	6/24/1996	18.86	8.28	0.01	10.59	Used LPH density 0.73
	7/15/1996	18.86	8.52	0.08	10.40	Used LPH density 0.73
	8/23/1996	18.86	8.63		10.23	
	9/18/1996	18.86	8.63		10.23	
	1/3/1997	18.86	4.97		13.89	
	3/12/1997	18.86	8.08		10.78	
	4/2/1997	18.86	8.14	0.03	10.74	Used LPH density 0.73
	5/1/1997	18.86	8.18		10.68	
	8/19/1997	18.86	8.57		10.29	
	9/17/1997	18.86	8.20		10.66	
	4/30/1998	18.86	6.70	0.08	12.22	Used LPH density 0.73
	7/28/1999	18.86	7.18	0.12	11.77	Used LPH density 0.73
	5/23/2000	18.86	6.91		11.95	
	5/24/2001	18.86	8.45	0.01	10.42	Used LPH density 0.73
	6/5/2002	18.86	6.42		12.44	
	5/29/2003	18.86	7.91	sheen	10.95	
	6/16/2004	18.86	7.65	0.02	11.22	Used LPH density 0.73
	6/20/2005	18.86	6.31		12.55	
	6/5/2006	18.86	5.99		12.87	
	10/23/2006	18.86	8.22		10.64	
	3/14/2007	21.89	5.41		16.48	
	9/10/2007	21.89	8.63		13.26	
	6/2/2008	21.89	8.49		13.40	
	8/25/2008	21.89	8.61		13.28	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
W-2	1/27/1993	18.28	5.11	0.16	13.29	Used LPH density 0.73
	3/12/1993	18.28	7.94	0.02	10.35	Used LPH density 0.73
	4/14/1993	18.28	7.96	0.02	10.33	Used LPH density 0.73
	6/30/1993	18.28	7.65	0.09	10.70	Used LPH density 0.73
	12/15/1993	18.28	8.04		10.24	
	2/8/1994	18.28	5.93	0.13	12.44	Used LPH density 0.73
	7/8/1994	18.28	8.69		9.59	
	8/12/1994	18.28	8.98		9.30	
	9/21/1994	18.28	9.38	0.18	9.03	Used LPH density 0.73
	11/4/1994	18.28	9.51	0.37	9.04	Used LPH density 0.73
	12/23/1994	18.28	4.92		13.36	
	2/3/1995	18.28	5.16		13.12	
	2/22/1995	18.28	6.57	0.06	11.75	Used LPH density 0.73
	3/24/1995	18.28	6.48	0.14	11.90	Used LPH density 0.73
	4/27/1995	18.28	5.65		12.63	
	5/15/1995	18.28	6.48	0.57	12.22	Used LPH density 0.73
	6/16/1995	18.28	6.93	0.60	11.79	Used LPH density 0.73
	8/25/1995	18.28	7.36	0.22	11.08	Used LPH density 0.73
	10/20/1995	18.28	7.67		10.61	
	4/4/1996	18.28	5.19	0.02	13.10	Used LPH density 0.73
	4/16/1996	18.28	4.40		13.88	
	5/10/1996	18.28	4.10		14.18	
	5/15/1996	18.28	4.08		14.20	
	5/22/1996	18.28	7.59		10.69	
	6/5/1996	18.28	7.69		10.59	
	6/24/1996	18.28	8.08		10.20	
	7/15/1996	18.28	8.45		9.83	
	8/23/1996	18.28	8.80		9.48	
	9/18/1996	18.28	8.98		9.30	
	1/3/1997	18.28	4.48		13.80	
	3/12/1997	18.28	7.57		10.71	
	4/2/1997	18.28	7.60		10.68	
	5/1/1997	18.28	7.72		10.56	
	8/19/1997	18.28	8.10		10.18	
	9/18/1997	18.28	7.40	0.07	10.93	Used LPH density 0.73
	4/30/1998	18.28	6.11	0.07	12.22	Used LPH density 0.73
	7/29/1999	18.28	6.50		11.78	
	5/23/2000	18.28	6.33		11.95	
	5/24/2001	18.28	8.10		10.18	
	6/5/2002	18.28	5.87	0.02	12.41	Used LPH density 0.73
	5/28/2003	18.28	7.32	sheen	10.96	
	6/15/2004	18.28	8.55		9.73	
	6/22/2005	18.28	5.71		12.57	
	6/5/2006	18.28	5.38		12.90	
	10/23/2006	18.28	7.63		10.65	
	3/14/2007	21.30	4.82		16.48	
	9/10/2007	21.30	8.97		12.33	
	6/2/2008	21.30	8.25		13.05	
	8/25/2008	21.30	8.51		12.79	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
W-3	1/27/1993	17.10	5.42		11.68	
	3/12/1993	17.10	6.11		10.99	
	4/14/1993	17.10	5.88		11.22	
	12/15/1993	17.10	5.59		11.51	
	11/4/1994	17.10	7.72		9.38	
	2/22/1995	17.10	5.82		11.28	
	6/16/1995	17.10	6.37		10.73	
	10/20/1995	17.10	6.17		10.93	
	4/4/1996	17.10	5.19		11.91	
	4/16/1996	17.10	4.86		12.24	
	5/10/1996	17.10	4.83		12.27	
	5/15/1996	17.10	4.71		12.39	
	5/22/1996	17.10	5.78		11.32	
	6/5/1996	17.10	6.07		11.03	
	6/24/1996	17.10	6.30		10.80	
	7/15/1996	17.10	6.65		10.45	
	9/18/1996	17.10	6.37		10.73	
	1/3/1997	17.10	3.72		13.38	
	4/2/1997	17.10	5.83	0.04	11.30	Used LPH density 0.73
	5/1/1997	17.10	5.80		11.30	
	9/17/1997	17.10				
	4/29/1998	17.10	5.81		11.29	
	7/30/1999	17.10	6.11		10.99	
	5/23/2000	17.10	5.55		11.55	
	5/22/2001	17.10	6.10		11.00	
	6/4/2002	17.10	5.78		11.32	
	5/28/2003	17.10	6.26		10.84	
	6/16/2004	17.10	6.23	0.02	10.88	Used LPH density 0.73
	6/21/2005	17.10	5.75		11.35	
	6/5/2006	17.10	5.43		11.67	
	10/23/2006	17.10	6.22		10.88	
	3/14/2007	19.95	4.74		15.21	
	9/10/2007	19.95	6.55		13.40	
	6/2/2008	19.95	6.20		13.75	
	8/25/2008	19.95	5.79		14.16	

TABLE 1

GROUND WATER ELEVATION DATA
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Date	Reference Elevation [1,2] (feet msl)	Depth to Water [3] (feet bmp)	LPH Thickness (feet)	Ground Water Elevation [4] (feet msl)	Notes
W-4	1/27/1993	18.03	4.43		13.60	
	3/12/1993	18.03	7.43		10.60	
	4/14/1993	18.03	7.32		10.71	
	12/15/1993	18.03	6.59		11.44	
	11/4/1994	18.03	8.20		9.83	
	2/22/1995	18.03	7.17		10.86	
	6/16/1995	18.03	7.55		10.48	
	10/20/1995	18.03	7.67		10.36	
	4/4/1996	18.03	6.12		11.91	
	4/16/1996	18.03	5.74		12.29	
	5/10/1996	18.03	5.99		12.04	
	5/15/1996	18.03	5.67		12.36	
	5/22/1996	18.03	7.20		10.83	
	6/5/1996	18.03	7.41		10.62	
	6/24/1996	18.03	7.49		10.54	
	7/15/1996	18.03	7.73		10.30	
	1/3/1997	18.03	4.80		13.23	
	4/2/1997	18.03	7.37		10.66	
	5/1/1997	18.03	7.34		10.69	
	9/17/1997	18.03	--		--	
	4/29/1998	18.03	6.84		11.19	
	7/30/1999	18.03	7.30		10.73	
	5/23/2001	18.03	7.71	0.03	10.34	Used LPH density 0.73
	6/4/2002	18.03	6.84		11.19	
	5/28/2003	18.03	7.68	sheen	10.35	
	6/15/2004	18.03	7.65	0.02	10.39	Used LPH density 0.73
	6/21/2005	18.03	6.78		11.25	
	6/5/2006	18.03	6.23		11.80	
	10/23/2006	18.03	7.67		10.36	
	3/14/2007	20.91	5.70		15.21	
	9/10/2007	20.91	8.20		12.71	
	6/2/2008	20.91	7.69		13.22	
	8/25/2008	20.91	8.00		12.91	

Notes

[1] Reference elevation (i.e., top of casing) relative to MSL (from Kleinfelder reports).

[2] New surveyed elevations on July 6, 2007

[3] Depth in feet, measured from top of polyvinyl chloride well casing.

[4] MSL elevation in feet, corrected for LPH thickness, if applicable, using density stated in "Notes" column.

*** = Reference elevation changed due to new well box installation.*

bmp = below measuring point

LPH = liquid phase hydrocarbons

msl = mean sea level

NM = not measured

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-1	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**18,000**	--	--	**1,300**	17	**450**	**2,200**
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	**7,800**	--	--	**590**	76	15	370
	11/4/1994	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/17/1997	475	**9,980**	**25,500**	**84.6**	2.63	6.43	21.8
	5/1/1998	560	**5,500**	**13,000**	**300**	10	24	94
	5/23/2000	**1,800**	**23,000**	**52,000**	**1,000**	14	170	160
	5/24/2001	**2,800**	**5,500**	**6,300**	**1,300**	25	410	220
	6/5/2002	86J	**17,000**	**29,000**	**37**	0.66J	6.6	6.9
	5/29/2003	**1,100J**	**4,700**	**8,300**	**760**	26	180	65
	6/15/2004	**1,600**	**8,700**	**18,000**	**890**	10	180	110
	6/20/2005	550J	**2,700J**	**5,300J**	**540**	5.5	79	45
	6/6/2006	**3,300j**	**1,570**	**553**	**602**	5.87	137	43.9
	10/24/2006	**3,770**	**884**	**800**	**363**	6.65	113	26.8
	3/14/2007	**2,420**	**1,720**	<185	**118**	4.35	188	21.3
	9/12/2007	**3,610**	--	--	**664**	9.88	155	43.6
	6/4/2008	**2,570**	**2,990**	**7,770**	**355**	3.54	54.7	37.3
	8/27/2008	**4,330**	--	--	**741**	8.40	75.1	139

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-2	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	7/8/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	**1,980,000**	**74,200**	**7,890**	**11,200**	**10,600**	**1,310**	**22,200**
	4/29/1998	**83,000**	**19,000**	**4,300**	**16,000**	**13,000**	600	**11,000**
	7/30/1999	**66,000**	**18,000**	<2.0	**11,000**	**7,900**	**700**	**9,700**
	5/23/2000	**59,000**	**32,000**	<5.0	**16,000**	**6,200**	670	**9,300**
	5/24/2001	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/5/2002	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	5/29/2003	**59,000**	**36,000**	**2,700J**	**8,800**	**2,200**	**900**	**9,600**
	6/15/2004	**57,000**	**68,000**	**<9,700**	**8,700**	510	**1,300**	**8,700**
	6/20/2005	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/6/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	10/23/2006	**47,000**	**10,700**	<180	**7,120**	179	289	**5,280**
	3/14/2007	**40,700**	**11,900**	<370	**7,740**	138	280	**6,150**
	9/11/2007	**35,600**	**8,190**	<103	**7,760**	71.1	635	**4,670**
	6/4/2008	**30,300**	**5,450**	369J	**5,980**	45.8	539	**3,240**
	8/27/2008	**22,200**	**4,820**	<100	**4,280**	47.8	243	**2,270**
	8/27/2008 (Dup)	**22,100**	**3,340**	129J	**4,030**	42.2	277	**2,360**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-3	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	7/8/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	7/28/1999	--	--	--	--	--	--	--
	5/23/2000	--	--	--	--	--	--	--
	5/24/2001	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/5/2002	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	5/27/2003	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/15/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/20/2005	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/6/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	10/23/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	3/14/2007	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	9/11/2007	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
B-3A	6/4/2008	**200,000**	**8,410**	275J	**40,800**	**38,800**	**2,840**	**16,400**
	8/27/2008	**171,000**	**11,200**	**790J**	**47,500**	**34,000**	**2,470**	**15,800**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-4	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	**1,170,000**	**99,600**	**<20,500**	**2,590**	**8,520**	**4,340**	**26,600**
	4/30/1998	--	--	--	--	--	--	--
	7/29/1999	**70,000**	**90,000**	**<20,000**	**1,800**	**1,600**	**2,300**	**13,000**
	5/23/2000	**76,000**	**51,000**	**<20,000**	**1,500**	**3,500**	**2,600**	**13,000**
	5/23/2001	**52,000**	**49,000**	**<20,000**	**600**	**2,300**	**2,500**	**10,000**
	6/5/2002	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	5/29/2003	**38,000**	**34,000**	**5,200J**	**280**	570	**1,400**	**5,900**
	6/15/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/20/2005	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/6/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	10/23/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	3/14/2007	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	9/11/2007	**22,100**	**3,460**	48.5J	**543**	67.9	**1,520**	**3,640**
	6/3/2008	**30,200**	**3,560**	217	**336**	258	**1,260**	**4,590**
	8/27/2008	**25,200**	**3,450**	199J	**604**	192	**1,130**	**4,630**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-5	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/17/1997	**38,900**	**28,100**	**8,980**	**2,810**	**3,750**	631	**5,180**
	4/29/1998	**28,000**	**81,000**	**17,000**	**1,600**	**1,100**	460	**4,600**
	7/29/1999	**21,000**	**18,000**	**<2,000**	**1,200**	240	330	**2,600**
	5/23/2000	**11,000**	**15,000**	**4,000J**	**690**	59	230	960
	5/23/2001	**10,000**	**13,000**	**3,500J**	**2,000**	120	320	**2,100**
	6/5/2002	**4,300**	**16,000**	**4,800J**	**940**	23	230	560
	5/29/2003	**3,300**	**4,300**	**1,600J**	**440**	26	260	260
	6/15/2004	**2,600**	**100,000**	**25,000**	**830**	23	110	310
	6/22/2005	**980J**	**36,000**	**17,000J**	**630**	6.7	70	140
	6/6/2006	**4,540j**	**2,860**	271u	**944**	14.4	214	507
	10/23/2006	**9,010**	**6,440**	**605**	**1,950**	23.8	372	904
	3/14/2007	**11,000**	**3,100**	339	**1,790**	21.4	494	909
	3/14/2007(Dup)	**10,500**	**3,500**	475	**1,920**	21.5	497	914
	9/11/07	**2,740**	**5,580**	**1,530**	**689**	9.89	72.2	191
	6/3/2008	**12,400**	**2,640**	**648**	**2,480**	24.8	311	656
	8/27/2008	**6,990**	**5,700**	**909J**	**1,330**	14.2	103	180

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
B-6	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/17/1996	--	--	**1,230**	**6.86**	6.6	2.19	13.1
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/17/1997	**194,000**	**102,000**	**61,700**	**2,850**	**7,070**	**1,270**	**7,860**
	4/29/1998	**160,000**	**51,000**	**6,900**	**7,500**	**16,000**	**2,600**	**18,000**
	7/29/1999	**97,000**	**23,000**	**<10,000**	**8,300**	**13,000**	**2,200**	**13,000**
	5/24/2001	**69,000**	**44,000**	**25,000**	**6,900**	**4,300**	**980**	**7,200**
	6/5/2002	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	5/29/2003	**35,000**	**7,700**	**4,500J**	**4,600**	**4,000**	450	**4,800**
	6/15/2004	**48,000**	**210,000**	**100,000**	**5,900**	**8,500**	**760**	**6,400**
	6/22/2005	**22,000**	**100,000**	**45,000**	**3,800**	**3,600**	200	**2,200**
	6/6/2006	**33,500**	**5,420**	**528**	**2,540**	**4,560**	664	**4,590**
	10/23/2006	**37,400**	**7,050**	371J	**2,660**	**5,280**	566	**4,650**
	3/14/2007	**41,200**	**4,740**	**532**	**1,780**	**5,230**	603	**7,220**
	9/11/2007	**38,900**	**6,270**	**1,030**	**2,560**	**3,370**	494	**5,460**
	6/4/2008	**52,000**	**7,350**	**4,460**	**5,320**	**8,210**	483	**7,740**
	8/27/2008	**37,600**	**14,800**	**17,400**	**3,670**	**6,140**	604	**4,820**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
D-1	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	190	--	--	**200**	0.62	13	1.2
	12/15/1993	83	--	--	**7.1**	<0.50	<0.50	1.3
	11/4/1994	52	--	--	2	<0.50	<0.50	<1.0
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	ABANDONED	--	--	--	--	--	--	--
D-2	11/4/1994	<50	--	--	3.0	<0.50	<0.50	<1.0
	ABANDONED	--	--	--	--	--	--	--
D-4	1/27/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	11/4/1994	450	--	--	<0.50	2.1	0.78	4.7
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	6/5/2002	--	--	--	--	--	--	--
	5/27/2003	--	--	--	--	--	--	--
	6/15/2004	--	--	--	--	--	--	--
	6/21/2005	Insufficient groundwa	--	--	--	--	--	--
	6/7/2006	101	**2,760**	**2,840**	<0.290	<0.280	<0.340	<0.820
	10/23/2006	--	--	--	--	--	--	--
	3/15/2007	92.3J	--	--	0.430J	0.460J	0.430J	0.750J
	9/11/2007	Insufficient groundwa	--	--	--	--	--	--
	6/2/2008	Insufficient groundwa	--	--	--	--	--	--
	8/26/2008	76.2J	268	441	<0.270	1.60	0.580J	1.45J

TABLE 2

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Former Mobil Bulk Terminal

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Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
D-5	1/27/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	12/15/1993	260	--	--	**14**	<0.50	1.7	2.1
	11/4/1994	170	--	--	**15**	3	<0.50	4
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	5/27/2003	--	--	--	--	--	--	--
	6/15/2004	--	--	--	--	--	--	--
	6/21/2005	--	--	--	--	--	--	--
	6/6/2006	--	--	--	--	--	--	--
	10/23/2006	--	--	--	--	--	--	--
	3/14/2007	--	--	--	--	--	--	--
	9/11/2007	Insufficient groundwa	--	--	--	--	--	--
	6/2/2008	Insufficient groundwa	--	--	--	--	--	--
	8/25/2008	Insufficient groundwa	--	--	--	--	--	--

TABLE 2

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Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
D-6	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/17/1997	--	--	--	--	--	--	--
	4/30/1998	<50	**14,000**	**86,000**	**11**	2	0.2	1.4
	5/23/2000	59J	**<2,000**	**<5,000**	**200**	5.6	1.0J	3.6
	5/23/2001	10J	**1,400**	**3,800**	**200**	9.1	4.2	5.2
	6/5/2002	87J	**900**	**2,600**	**120**	9.6	2.3	5.8
	5/27/2003	<48	**7,600J**	**37,000**	**7.2**	1.1	0.3J	0.9J
	6/15/2004	59J	**1,300J**	**5,800**	**78.0**	4.3	1.7	3.6
	6/22/2005	160J	**3,700**	**4,000J**	**130**	14.0	2.5	8.4
	6/7/2006	342	**1,580**	**1,050**	**22.2**	0.960J	0.580J	<0.820
	10/23/2006	445	**1,490**	**4,160**	**111**	19.0	4.97	22.7
	3/14/2007	487	**792**	**604**	**150**	3.32	2.24	3.12
	9/11/2007	425	--	--	**160**	6.32	2.56	5.78
	6/3/2008	497	391	**520**	**100**	2.38	0.620J	1.64J
	8/27/2008	559	**1,840**	**4,810**	**145**	4.09	1.65	3.62

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Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
D-7	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	77	--	--	**1,300**	21	**420**	**2,200**
	12/15/1993	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	210	--	--	**88**	2.1	4.7	13
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	3/24/1996	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/17/1997	453	**7,990**	**22,400**	**150**	13.5	7.04	35.5
	4/30/1998	170	**3,300**	**6,200**	**63**	5.0	0.9	7
	5/23/2000	120J	**4,600J**	**19,000**	**480**	7.2	1.6	13
	5/23/2001	130J	**4,100J**	**17,000**	**410**	8.7	1.6	18
	6/4/2002	70J	**9,300**	**31,000**	**180**	6.7	0.72J	8.1
	5/27/2003	<48	**15,000**	**62,000**	**55**	0.7J	0.4J	2.0J
	6/15/2004	88J	**15,000**	**51,000**	**190**	18.0	0.5J	3.8
	6/22/2005	140J	**11,000**	**36,000**	**83**	5.7	0.9J	9.0
	6/7/2006	281	**3,760**	**9,490**	**70.4**	2.94	<0.340	<0.820
	10/24/2006	56.2Ju	**913J**	**37,200**	**6.98**	0.630J	<0.230	<0.440
	3/14/2007	76.3J	**762**	**2,830**	**5.57**	0.580 J	<0.420	<0.450
	9/12/2007	70.7J	**897**	**3,130**	**10.6**	1.39	<0.420	<0.450
	6/3/2008	452	**1,760**	**3,220**	**33.4**	0.470J	<0.240	2.33J
	8/27/2008	762	--	--	**96.6**	4.96	1.04	7.08

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-1	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	80	--	--	<0.50	<0.50	<0.50	<1.0
	12/15/1993	<50	--	--	<0.50	<0.50	<0.50	<1.0
	11/4/1994	<50	--	--	<0.50	1.3	0.61	2.2
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/17/1997	<50	<250	<500	<0.50	<0.50	<0.50	<1.0
	4/29/1998	<50	110	**540**	<0.20	0.4	<0.20	1.2
	7/28/1999	--	--	--	--	--	--	--
	5/24/2000	100J	320	370J	0.29J	<0.20	0.71J	2.4J
	5/23/2001	<48	<80	<200	<0.2	<0.2	<0.2	<0.60
	6/4/2002	<48	<77	<97	<0.20	0.35J	<0.20	<0.60
	5/28/2003	<48	<75	<94	<0.2	<0.2	0.3J	<0.6
	6/15/2004	<48	<80	<100	<0.2	<0.2	<0.2	<0.6
	6/22/2005	<48	<77	<97	<0.2	<0.2	<0.2	<0.6
	6/7/2006	<40	<35.8	92.7J	<0.290	<0.280	<0.340	<0.820
	6/7/2006 (Dup)	<40	<36.2	125	<0.290	<0.280	<0.340	<0.820
	10/24/2006	10.9Ju	**877**	**1,090**	<0.310	<0.220	<0.230	<0.440
	3/14/2007	47.8J	48.3J	<35.6	0.400J	0.700J	<0.420	1.76J
	9/12/2007	<43.0	<19.6	27.2J	0.520J	<0.420	<0.420	1.17J
	6/3/2008	<43.0	<19.0	25.9J	<0.270	<0.280	<0.240	<0.860
	8/26/2008	<43.0	48.6J	62.3J	0.580J	<0.280	<0.240	1.14J

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-2	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**160,000**	--	--	**7,900**	**30,000**	**2,900**	**17,000**
	12/15/1993	**90,000**	--	--	**1,200**	860	**3,000**	**15,000**
	11/4/1994	**1,800,000**	--	--	**1,700**	**13,000**	**8,900**	**57,000**
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	**16,500**	**13,500**	<500	**1,820**	648	204	**1,590**
	4/30/1998	**65,000**	**12,000**	**3,000**	**9,400**	**11,000**	**1,100**	**7,900**
	7/30/1999	**67,000**	**76,000**	**<10,000**	**10,000**	**8,700**	**1,200**	**10,000**
	5/23/2000	**69,000**	**71,000**	**<25,000**	**12,000**	**7,300**	**1,700**	**11,000**
	5/23/2001	**36,000**	**28,000**	**<4,000**	**8,100**	**2,100**	**910**	**5,200**
	6/4/2002	**81,000**	**68,000**	**<9,800**	**12,000**	**12,000**	**1,700**	**14,000**
	5/27/2003	**99,000**	**33,000**	**3,000J**	**9,200**	**5,800**	**1,800**	**14,000**
	6/16/2004	**31,000**	--	--	**5,800**	980	690	**4,500**
	6/21/2005	**35,000**	**290,000**	**<20,000**	**4,700**	**2,700**	440	**4,000**
	6/6/2006	**60,200**	**9,720**	313Ju	**7,710**	**5,560**	**874**	**10,200**
	10/24/2006	**31,700**	--	--	**4,890**	**1,480**	**794**	**5,610**
	3/15/2007	**73,600**	**14,900**	**534J**	**9,840**	**8,540**	**1,210**	**14,800**
	9/12/2007	**52,000**	--	--	**11,000**	**2,400**	**2,400**	**8,340**
	6/4/2008	**81,600**	**6,290**	283J	**8,440**	**5,060**	**2,080**	**11,400**
	8/27/2008	**60,400**	--	--	**11,600**	**4,810**	**3,100**	**9,480**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-3	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	770	--	--	**73**	12	6.2	**37**
	12/15/1993	140	--	--	**19**	0.58	1.5	3.8
	11/4/1994	380	--	--	**26**	6.0	2.0	8.7
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	<50	**2,350**	**1,280**	<0.50	<0.50	<0.50	<1.0
	4/30/1998	310	**1,200**	**1,400**	**84**	9.0	2.0	7.0
	5/23/2000	480	**590**	**1,100**	**87**	8.1	2.2	7.4
	5/23/2001	330	--	--	**37**	0.63J	0.42J	3.5
	6/4/2002	480	**5,900**	**710J**	**120**	16.0	4.2	23.0
	5/27/2003	<24	--	--	**230**	4.6J	3.8J	8.9J
	DRY	--	--	--	--	--	--	--
	6/22/2005	63J	--	--	**140**	0.7J	1.4	3.9
	6/7/2006	531	**755**	470	**80.8**	6.59	0.620J	0.880J
	10/23/2006	--	--	--	--	--	--	--
	3/15/2007	**3,400**	**1,050**	**547**	**569**	7.16	6.50	12.4
	9/12/2007	Insufficient groundwa	--	--	--	--	--	--
	6/2/2008	Insufficient groundwa	--	--	--	--	--	--
	8/25/2008	Insufficient groundwa	--	--	--	--	--	--

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-4	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	230	--	--	<0.50	1.7	4.5	12
	12/15/1993	<50	--	--	<0.50	<0.50	<0.50	<1.0
	11/4/1994	<50	--	--	<0.50	<0.50	<0.50	<1.0
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	**3,980**	**610**	**797**	**193**	280	68.6	503
	4/30/1998	<250	**530**	**1,600**	<1.0	<1.0	<1.0	<3.0
	5/23/2000	<48	420J	**1,500**	<0.2	<0.2	<0.2	<0.6
	5/23/2001	<48	**550**	**1,900**	<0.2	7.60	<0.2	<0.6
	6/4/2002	<48	230J	270J	0.22J	0.33J	<0.2	1.1J
	5/27/2003	<48	410	**720**	<0.2	2.3	<0.2	<0.6
	6/16/2004	70J	470	**590J**	<0.2	4.7	<0.2	<0.6
	6/22/2005	<48	**560**	**1,000**	<0.2	0.6J	<0.2	1.0J
	6/6/2006	--	--	--	--	--	--	--
	10/24/2006	275	325	**672**	**60.6**	21.0	2.92	19.2
	3/15/2007	66.5J	**519**	155	<0.330	<0.420	<0.420	<0.450
	9/12/2007	84.9J	--	--	<0.330	<0.420	<0.420	0.770J
	6/4/2008	131	94.0J	204	0.920J	2.95	1.65	7.44
	8/26/2008	<43.0	188	421	<0.270	<0.280	<0.240	<0.860

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-5	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**3,500**	--	--	**22**	2.2	84	210
	12/15/1993	710	--	--	**17**	18	1.2	38
	11/4/1994	250	--	--	**14**	1.5	1.6	2.9
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	349	**1,790**	**969**	**18.50**	2.45	1.89	6.8
	5/1/1998	**950**	**640**	**840**	**15**	3	7	5
	7/29/1999	480	240J	<200	**17**	3	0.4J	9
	5/23/2000	410	380	**630**	**9.1**	2.6	2	5.5
	5/22/2001	480	290	<200	2.5	1.7	0.23J	3.0
	6/5/2002	**880**	260	110J	**30.0**	5.3	140	16.0
	5/28/2003	**21,000**	310	150J	**2,700**	**5,200**	350	**1,700**
	6/16/2004	570	**1,400J**	**<1,000**	3.0	1.2	3.1	25
	6/20/2005	86J	**790**	<94	2.7	<0.2	<0.2	0.7J
	6/7/2006	173	205	171	0.570J	<0.280	<0.340	<0.820
	10/24/2006	303	178	<35.8	**22.7**	3.42	1.72	2.92J
	3/15/2007	133	454	<37.0	3.79	<0.420	0.770J	<0.450
	9/11/2007	507	**525**	76.2J	**78.7**	5.24	9.22	16.2
	6/4/2008	**999**	185	116	4.66	2.74	30.9	8.96
	8/26/2008	**1,220**	360	136	**24.7**	11.5	5.64	31.4

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-6	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**63,000**	--	--	**1,400**	**9,300**	**1,200**	**10,000**
	12/15/1993	**59,000**	--	--	**1,400**	**1,400**	**7,400**	**10,000**
	11/4/1994	**53,000**	--	--	**960**	**2,700**	**790**	**9,500**
	2/22/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/17/1997	**43,100**	**25,100**	<500	**934**	973	**922**	**7,670**
	5/1/1998	**43,000**	**24,000**	**<5,000**	**1,100**	**1,200**	**1,300**	**8,700**
	7/30/1999	**47,000**	**16,000**	**<2,000**	**950**	360	**1,500**	**8,300**
	5/22/2000	**37,000**	**10,000**	**<4,000**	**870**	430	**1,500**	**6,800**
	5/22/2001	**38,000**	**14,000**	**<2,000**	**820**	370	**1,600**	**8,000**
	6/5/2002	**36,000**	**5,800**	**990J**	**650**	210	**1,700**	**7,100**
	5/28/2003	**32,000**	**4,100**	**5,400J**	**590**	210	**1,200**	**5,900**
	6/16/2004	**52,000**	**41,000**	**<2,500**	**590**	330	**1,300**	**8,500**
	6/20/2005	**18,000**	**11,000**	**<960**	**330**	150	690	**2,800**
	6/7/2006	**18,600**	**3,700j**	106J	**345**	189	**1,040**	**2,900**
	10/24/2006	**19,000**	**2,670j**	<71.4uj	**422**	172	**948**	**2,570**
	3/15/2007	**17,700**	**3,290**	<74.0	**409**	209	**1,170**	**4,300**
	9/11/2007	**19,800**	**2,600**	52.6	**471**	197	**1,360**	**2,200**
	6/3/2008	**24,900**	**2,120**	165	**365**	304	**1,550**	**4,330**
	8/26/2008	**22,800**	**1,420**	48.8J	**349**	237	**1,320**	**2,470**

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GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-7	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/99	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	7/8/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	7/29/1999	**17,000**	**16,000**	**<10,000**	**1,200**	69	**890**	**1,200**
	5/22/2000	**7,000**	**9,200**	**<4,000**	**460**	31	510	580
	5/22/2001	**4,700**	**7,100**	**<2,000**	**290**	25	350	470
	6/5/2002	**8,800**	**4,100**	<470	**1,500**	73	**760**	**1,000**
	5/28/2003	**11,000**	**9,000**	**<960**	**1,000**	100	**920**	**1,300**
	6/15/2004	**8,500**	**3,400**	<490	**730**	48	600	**1,200**
	6/20/2005	740	**1,500**	<200	**170**	5	84	18
	6/7/2006	<40	**14,700**	**1,610**	0.480J	<0.280	<0.340	<0.820
	10/24/2006	537	**1,040j**	408j	**46.9**	4.32	7.86	23.5
	3/15/2007	**3,880**	**3,270**	<181	**385**	30.0	658	166
	9/11/2007	**9,440**	**4,300**	<41.0	**777**	31.8	**1,540**	504
	6/3/2008	**13,700**	**4,270**	357	**653**	70.6	**1,620**	**1,430**
	8/26/2008	**6,940**	**4,410**	137J	**635**	31.7	**1,100**	928

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-8	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**8,100**	--	--	**140**	150	200	**1,100**
	12/15/1993	**3,200**	--	--	**100**	68	11	390
	11/4/1994	610	--	--	**25**	2.9	15	54
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	**2,840**	**6,760**	**2,360**	**29.2**	11.9	19.8	239
	5/1/1998	**4,300**	**14,000**	**19,000**	**110**	130	190	600
	7/29/1999	**6,000**	**2,200**	<200	**37**	30	140	**1,000**
	5/22/2000	**1,100**	**810**	**700**	**13**	9.7	28	170
	5/22/2001	**650**	**800**	350J	**15**	3.8	26	95
	6/5/2002	**1,200**	**3,000**	**1,100**	**6.8**	4.4	31	160
	5/28/2003	**67,000**	**1,800**	**530**	**11,000**	**16,000**	**1,100**	**5,400**
	6/15/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/20/2005	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/6/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	10/23/2006	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	3/14/2007	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	9/11/2007	**4,230**	**31,000**	**1,270J**	**2,360**	**7,210**	408	**2,310**
	6/3/2008	**43,800**	**2,250**	**719**	**3,730**	**14,800**	**956**	**4,650**
	8/26/2008	**34,600**	**2,620**	**778**	**3,770**	**10,700**	**763**	**3,750**

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-9	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**74,000**	--	--	**1,700**	**2,000**	**2,100**	**14,000**
	12/15/1993	**50,000**	--	--	**990**	**1,300**	130	**9,300**
	11/4/1994	**55,000**	--	--	**570**	91	**1,200**	**8,200**
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	**21,800**	**6,100**	**<1,000**	**142**	22.8	**372**	**2,460**
	4/29/1998	**32,000**	**44,000**	**<25,000**	**410**	**60**	**1,200**	**4,500**
	7/28/1999	--	--	--	--	--	--	--
	5/24/2000	**7,400**	**12,000**	**3,400**	**310**	21	320	380
	5/23/2001	**3,400**	**15,000**	**<2,000**	**290**	15	290	490
	6/4/2002	**12,000**	**5,300**	**1,000J**	**530**	13	**810**	910
	5/28/2003	**9,500**	**3,800**	**<1,100**	**310**	6.3	610	190
	6/17/2004	**4,300**	--	--	**250**	2.1	280	6.8
	6/20/2005	**4,800**	**15,000**	**1,800J**	**220**	2.4	260	5.8
	6/6/2006	**3,750j**	**3,220**	337u	**177**	3.58	435	420
	10/24/2006	**7,050**	**3,080**	248	**248**	2.58	580	8.43
	3/15/2007	**6,360**	**3,100**	<82.2	**245**	5.66	468	8.72
	9/11/2007	**5,600**	**4,290**	**702**	**399**	10.1	345	50.0
	6/4/2008	**5,870**	**1,340**	165J	**130**	4.37	141	10.8
	8/27/2008	**5,730**	**3,160**	**705**	**388**	7.34	277	13.0

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-10	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**77,000**	--	--	**540**	**4,600**	**1,800**	**12,000**
	12/15/1993	**24,000**	--	--	**430**	410	**1,400**	**3,800**
	11/4/1994	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	5/23/2001	Well not sampled, bai	--	--	--	--	--	--
	6/6/2002	**8,900**	--	--	**44**	66	530	**1,600**
	5/27/2003	Well not sampled, bai	--	--	--	--	--	--
	6/17/2004	Well not sampled, bai	--	--	--	--	--	--
	6/21/2005	**3,500**	--	--	**23**	7	170	320
	6/6/2006	**852**	**999**	97.5	**52.6**	5.50J	63.7	19.1J
	10/24/2006	**2,280**	--	--	**36.2**	<0.220	47.4	99.4
	3/15/2007	**4,590**	**1,610**	371	**49.8**	13.2	332	425
	9/12/2007	Insufficient groundwa	--	--	--	--	--	--
	6/4/2008	**4,710**	--	--	**16.1**	7.79	175	283
	8/27/2008	**2,160**	**2,400**	**510**	**5.61**	5.32	34.4	39.2
HA-11	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**29,000**	--	--	**910**	42	**820**	**3,700**
	12/15/1993	**5,300**	--	--	**360**	160	98	780
	11/4/1994	**13,000**	--	--	**610**	190	300	**1,900**
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	4/29/1998	**4,600**	**4,200**	**1,800**	**230**	28	100	520
	7/28/1999	--	--	--	--	--	--	--
	5/24/2000	**13,000**	**3,300**	**1,400**	**710**	200	450	**2,300**
	5/23/2001	**6,100**	--	--	**570**	83	280	910
	6/4/2002	**3,000**	--	--	**660**	18	100	450
	5/27/2003	**16,000**	--	--	**1,400**	74	560	**2,300**
	DRY	--	--	--	--	--	--	--
	6/21/2005	**4,100**	--	--	**500**	6.6	150	460
	6/7/2006	**8,760**	**3,320j**	147J	**662**	17.0	443	**1,420**
	10/24/2006	**7,410**	**3,560**	**1,370**	**1,510**	12.2	385	710
	3/15/2007	**5,180**	**3,700**	**508**	**504**	8.96	294	842
	9/12/2007	Insufficient groundwa	--	--	--	--	--	--
	6/4/2008	**4,290**	--	--	**602**	4.46	159	415
	8/25/2008	Insufficient groundwa	--	--	--	--	--	--

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GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-12	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	<50	--	--	1.3	<0.50	<0.50	<1.0
	12/15/1993	700	--	--	**6.0**	5.7	16	170
	11/4/1994	300	--	--	2.2	1.6	1.8	9.7
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/18/1997	139	**6,350**	<500	1.05	<0.50	<0.50	1.9
	5/1/1998	<50	<80	**780**	0.3	0.5	0.3	1.5
	7/29/1999	<48	180J	200	3	0.8J	<0.2	1.3J
	5/22/2000	<48	250	**520**	1.2	0.24J	<0.2	<0.6
	5/22/2001	<48	410	<200	3.7	0.24J	<0.2	<0.6
	6/5/2002	<48	130J	<95	0.31J	<0.2	<0.2	<0.6
	5/28/2003	<48	280	**610**	0.4J	<0.2	<0.2	<0.6
	6/16/2004	<48	490	250J	4.5	0.3J	<0.2	0.8J
	6/21/2005	<48	180J	<100	0.3J	<0.2	0.5J	<0.6
	6/7/2006	<40	165	70.1J	<0.290	<0.280	<0.340	<0.820
	10/24/2006	58.2Ju	103	**564**	4.85	1.60	0.860J	0.870J
	3/15/2007	71.6J	90.3J	<37.0	<0.330	<0.420	0.530J	0.630J
	9/11/2007	72.6J	283	181	<0.330	<0.420	<0.420	<0.450
	6/4/2008	110	228	316	0.310J	<0.280	0.570J	1.05J
	8/27/2008	<43.0	**584**	**722**	<0.270	1.23	0.380J	<0.860

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Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-13	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	<50	--	--	<0.50	<0.50	<0.50	<1.0
	12/15/1993	<50	--	--	<0.50	<0.50	<0.50	<1.0
	11/4/1994	<50	--	--	<0.50	1.4	<0.50	3.0
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	59	310	<500	<0.50	<0.50	<0.50	<1.0
	4/30/1998	<250	<250	<500	<1.0	1.00	<1.0	<3.0
	7/28/1999	--	--	--	--	--	--	--
	5/22/2000	<48	130J	450J	<0.2	<0.2	<0.2	<0.6
	5/22/2001	<48	86J	<200	<0.2	<0.2	<0.2	<0.6
	6/4/2002	<48	<84	<110	<0.2	<0.2	<0.2	<0.6
	5/27/2003	**7,100**	84J	<96	**43**	290	120	840
	6/16/2004	<48	<77	<96	<0.2	<0.2	<0.2	<0.6
	6/21/2005	<48	230J	<200	<0.2	<0.2	0.5J	0.27J
	6/7/2006	<40	163	329	<0.290	<0.280	<0.340	<0.820
	10/24/2006	100	<37.8	<37.8	**7.34**	1.83	0.770J	0.750J
	3/15/2007	63.6J	59.7J	110	<0.330	<0.420	<0.420	0.500J
	9/11/2007	47.5J	--	--	0.580J	<0.420	<0.420	0.700J
	6/4/2008	52.3J	41.1J	58.9J	<0.270	<0.280	0.410J	<0.860
	8/27/2008	57.7J	34.1J	53.9J	<0.270	0.920J	0.240J	<0.860

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Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
HA-14	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**5,300**	--	--	**400**	22	290	**1,000**
	12/15/1993	<50	--	--	<0.50	<0.50	<0.50	<1.0
	11/4/1994	180	--	--	**5**	1.8	3.9	11
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/18/1997	324	**972**	**752**	**6.45**	1.06	7.98	9.17
	4/30/1998	**1,800**	460	<500	**210**	15	190	100
	7/29/1999	**4,700**	**1,100**	<200	**450**	38	**710**	120
	5/22/2000	**3,700**	**1,100**	**520J**	**470**	26	**760**	63
	5/22/2001	**890**	430	230J	**120**	5.5	200	10
	6/4/2002	**2,200**	**1,400**	**1,000**	**380**	16.0	470	32
	5/27/2003	**860**	300	220J	**91**	2.7	140	11
	6/16/2004	220J	**780**	280J	**56**	2.6	52	5
	6/21/2005	**1,200**	**660**	390J	**260**	5.8	250	18
	6/7/2006	<40	--	--	<0.290	<0.280	0.560J	<0.820
	10/24/2006	288	--	--	**12.3**	2.06	9.60	1.42J
	3/15/2007	121	187	50.1J	4.09	<0.420	4.99	0.610J
	9/11/2007	628	--	--	**92.8**	1.30	157	3.45
	6/4/2008	529	**1,150**	**1,820**	**30.1**	0.780J	67.5	1.71J
	8/27/2008	350	**513**	**863**	**31.5**	2.25	72.1	2.63J
HB-1	12/7/1993	61	--	--	<0.50	<0.50	0.14	0.12
	DISCONTINUED SAMPL	--	--	--	--	--	--	--
HB-2	12/7/1993	68	--	--	0.092	<0.50	0.17	0.13
	DISCONTINUED SAMPL	--	--	--	--	--	--	--

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Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
R-1	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	9/26/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	7/8/1997	--	--	--	--	--	--	--
	8/26/1997	--	--	--	--	--	--	--
	9/17/1997	**3,360,000**	**206,000**	**23,500**	**7,620**	**3,460**	**1,460**	**9,460**
	4/30/1998	--	--	--	--	--	--	--
	5/24/2001	--	--	--	--	--	--	--
	6/5/2002	--	--	--	--	--	--	--
	5/27/2003	--	--	--	--	--	--	--
	6/20/2005	--	--	--	--	--	--	--
	6/6/2006	--	--	--	--	--	--	--
	10/23/2006	--	--	--	--	--	--	--
	3/14/2007	--	--	--	--	--	--	--
	9/11/2007	--	--	--	--	--	--	--
	6/4/2008	--	--	--	--	--	--	--
	8/25/2008	--	--	--	--	--	--	--

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
R-2	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	9/26/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	7/8/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/17/1997	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	5/24/2001	--	--	--	--	--	--	--
	6/5/2002	--	--	--	--	--	--	--
	5/27/2003	--	--	--	--	--	--	--
	6/20/2005	--	--	--	--	--	--	--
	6/6/2006	--	--	--	--	--	--	--
	10/23/2006	--	--	--	--	--	--	--
	3/14/2007	--	--	--	--	--	--	--
	9/11/2007	--	--	--	--	--	--	--
	6/4/2008	--	--	--	--	--	--	--
	8/5/2008	--	--	--	--	--	--	--

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
W-1	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/17/1997	--	--	--	--	--	--	--
	4/30/1998	--	--	--	--	--	--	--
	7/28/1999	--	--	--	--	--	--	--
	5/23/2000	**190,000**	**160,000**	**<100,000**	**34,000**	**42,000**	**3,600**	**23,000**
	5/24/2001	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/5/2002	**130,000**	**79,000**	**<9,400**	**17,000**	**27,000**	**2,700**	**19,000**
	5/29/2003	**170,000**	**79,000**	**<4,800**	**20,000**	**25,000**	**3,400**	**23,000**
	6/16/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/20/2005	**93,000**	**120,000**	**<11,000**	**12,000**	**13,000**	**1,600**	**12,000**
	6/7/2006	**69,500**	**7,500**	337	**8,680**	**6,260**	**726**	**8,240**
	10/23/2006	**91,700**	**9,070**	<183	**14,500**	**8,400**	**2,420**	**20,800**
	3/14/2007	**70,300**	**16,100**	**<740**	**8,920**	**2,800**	**1,010**	**17,600**
	3/14/2007(Dup)	**63,200**	**11,000**	<370	**9,340**	**3,010**	**1,130**	**19,200**
	9/11/2007	Insufficient groundwa	--	--	--	--	--	--
	6/4/2008	**81,900**	**23,900**	**1,370**	**14,600**	697	**1,510**	**17,100**
	8/25/2008	Insufficient groundwa	--	--	--	--	--	--

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Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
W-2	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	--	--	--	--	--	--	--
	6/30/1993	--	--	--	--	--	--	--
	12/15/1993	--	--	--	--	--	--	--
	2/8/1994	--	--	--	--	--	--	--
	7/8/1994	--	--	--	--	--	--	--
	8/12/1994	--	--	--	--	--	--	--
	9/21/1994	--	--	--	--	--	--	--
	11/4/1994	--	--	--	--	--	--	--
	12/23/1994	--	--	--	--	--	--	--
	2/3/1995	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	3/24/1995	--	--	--	--	--	--	--
	4/27/1995	--	--	--	--	--	--	--
	5/15/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	8/25/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	8/23/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	3/12/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	8/19/1997	--	--	--	--	--	--	--
	9/18/1997	**393,000**	**85,200**	**19,200**	**19,400**	**11,700**	**3,550**	**18,000**
	4/30/1998	--	--	--	--	--	--	--
	7/29/1999	**110,000**	**36,000**	**<10,000**	**12,000**	**11,000**	**1,900**	**13,000**
	5/23/2000	**85,000**	**50,000**	**<20,000**	**15,000**	**19,000**	**1,500**	**10,000**
	5/24/2001	**25,000**	**30,000**	**13,000**	**7,600**	**3,000**	420	**4,400**
	6/5/2002	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	5/28/2003	**98,000**	**28,000**	**7,800J**	**16,000**	**15,000**	**2,200**	**12,000**
	6/15/2004	**85,000**	**460,000**	**<50,000**	**21,000**	**5,700**	**2,800**	**8,700**
	6/22/2005	**50,000**	**73,000**	**<4,000**	**11,000**	**2,000**	**1,800**	**6,900**
	6/6/2006	**34,400**	**5,880**	283Ju	**6,640**	**1,660**	464	**4,760**
	10/23/2006	**53,000**	**5,800**	<183	**12,500**	**3,470**	**1,710**	**8,220**
	10/23/2006 (Dup)	**60,800**	**5,890**	<183	**12,000**	**2,840**	**1,650**	**7,420**
	3/14/2007	**51,800**	**12,400**	<370	**9,060**	**1,840**	**2,010**	**10,500**
	9/11/2007	**42,900**	**5,780**	<100	**14,000**	572	**1,610**	**3,040**
	6/3/2008	**51,900**	**46,300**	**3,330J**	**15,100**	215	**2,250**	**3,510**
	8/27/2008	**49,000**	**5,050**	363J	**18,700**	147	**1,970**	**3,630**

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Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
W-3	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**91,000**	--	--	**2,000**	**4,800**	**2,700**	**15,000**
	12/15/1993	**45,000**	--	--	**670**	**1,300**	580	**8,300**
	11/4/1994	**39,000**	--	--	**520**	**190**	630	**5,100**
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	9/18/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/17/1997	**105,000**	**15,000**	**<500**	**2,820**	**8,730**	**1,570**	**11,500**
	4/29/1998	**54,000**	**18,000**	**<5,000**	**920**	850	**2,000**	**10,000**
	7/30/1999	**48,000**	**48,000**	**<10,000**	**2,900**	**1,900**	**1,800**	**6,900**
	5/23/2000	**34,000**	**19,000**	**<10,000**	**910**	180	**1,400**	**4,900**
	5/22/2001	**19,000**	**28,000**	**<10,000**	**890**	36	**1,100**	**2,200**
	6/4/2002	**17,000**	**36,000**	**<4,800**	**1,900**	45	640	**2,300**
	5/28/2003	**16,000**	**55,000**	**<4,800**	**500**	32	600	740
	6/16/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/21/2005	**9,100**	**10,000**	**<980**	**790**	15	470	490
	6/6/2006	**13,400**	**3,090**	153u	**1,880**	25.1	640	821
	10/24/2006	**12,200**	**2,300**	<35.2	**933**	21.3	293	638
	10/24/2006 (Dup)	**9,520**	**2,050**	<36.9	**877**	18.3	301	535
	3/14/2007	**9,370**	**2,200**	<185	**687**	18.9	286	446
	9/12/2007	**9,180**	**2,940**	40.0J	**614**	13.1	397	437
	6/4/2008	**13,000**	**2,210**	46.9J	**727**	149	576	724
	6/4/2008 (Dup)	**12,400**	**1,980**	42.2J	**753**	230	519	686
	8/26/2008	**14,600**	**3,240**	46.8J	**763**	176	564	**1,450**

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2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**
W-4	1/27/1993	--	--	--	--	--	--	--
	3/12/1993	--	--	--	--	--	--	--
	4/14/1993	**130,000**	--	--	**2,600**	**7,800**	**2,800**	**20,000**
	12/15/1993	**180,000**	--	--	**3,200**	**2,700**	**11,000**	**18,000**
	11/4/1994	--	--	--	--	--	--	--
	2/22/1995	--	--	--	--	--	--	--
	6/16/1995	--	--	--	--	--	--	--
	10/20/1995	--	--	--	--	--	--	--
	4/4/1996	--	--	--	--	--	--	--
	4/16/1996	--	--	--	--	--	--	--
	5/10/1996	--	--	--	--	--	--	--
	5/15/1996	--	--	--	--	--	--	--
	5/22/1996	--	--	--	--	--	--	--
	6/5/1996	--	--	--	--	--	--	--
	6/24/1996	--	--	--	--	--	--	--
	7/15/1996	--	--	--	--	--	--	--
	1/3/1997	--	--	--	--	--	--	--
	4/2/1997	--	--	--	--	--	--	--
	5/1/1997	--	--	--	--	--	--	--
	9/17/1997	**114,000**	**276,000**	<500	**1,750**	<100	**1,480**	**8,490**
	4/29/1998	**84,000**	**250,000**	**<20,000**	**2,400**	120	**1,600**	**8,000**
	7/30/1999	**53,000**	**42,000**	**<10,000**	**2,100**	100	**1,900**	**6,300**
	5/23/2001	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/4/2002	**35,000**	**59,000**	**6,800J**	**2,300**	32	**1,800**	**3,500**
	5/28/2003	**32,000**	**26,000**	**1,600J**	**800**	22	**1,500**	**1,000**
	6/15/2004	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**	**LPH**
	6/21/2005	**23,000**	**110,000**	**<19,000**	**1,200**	11	**1,400**	200
	6/6/2006	**9,180**	**4,620**	411	**1,230**	18.4	**1,010**	67.4
	10/24/2006	**17,200**	**5,570**	<70.5	**1,520**	8.34	**1,490**	18.9
	3/14/2007	**10,100**	**4,820**	<185	**422**	11.0	456	148
	9/12/2007	Insufficient groundwa	**--**	--	--	--	--	--
	6/4/2008	**10,600**	**4,870**	110J	**941**	34.3	**714**	58.0
	8/26/2008	**11,700**	**15,100**	**1,810**	**1,370**	20.1	**750**	39.5

TABLE 2

GROUND WATER ANALYTICAL DATA, TOTAL PETROLEUM HYDROCARBONS AS GASOLINE, DIESEL, AND MOTOR OIL, BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENES

Former Mobil Bulk Terminal

2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	NWTPH-Gx [1] µg/L	NWTPH-Dx Diesel Range (C12-C24) [2] µg/L	NWTPH-Dx Heavy Oil Range (C24-C40) [2] µg/L	Benzene [3] µg/L	Toluene [3] µg/L	Ethyl Benzene [3] µg/L	Total Xylenes [3] µg/L
Cleanup Level [4]		**800 / 1000 ***	**500**	**500**	**5**	**1000**	**700**	**1000**

Notes

Data prior to 2006 was collected and reported by Kleinfelder.

***Bold** data indicates concentrations above MTCA Method A cleanup levels*

[1] Northwest Method Total Petroleum Hydrocarbons - Gasoline range

[2] Northwest Method Total Petroleum Hydrocarbons - Diesel and Heavy Oil range

[3] EPA Method 8020 prior to 2006, Method 8260B starting with 2006

[4] MTCA Method A Cleanup Levels

"--" = Not Analyzed

"<" = Concentration less than laboratory detection limit listed

** = Total petroleum hydrocarbons as gasoline cleanup levels for ground water is 800 µg/L if benzene is present, or 1,000 µg/L if benzene is not present*

µg/L = micrograms per liter

Dup = duplicate sample

EPA = United States Environmental Protection Agency

LPH = liquid phase hydrocarbons present; not sampled

MTCA = Model Toxics Control Act

Data Qualifiers (analytical laboratory data qualifiers in upper case, data validation qualifiers in lower case)

J or j = Estimated value. The analyte was positively identified, but the associated numerical result is an estimate.

u = Not detected (data validation qualifier only)

uj = Not detected. The associated numerical value is an estimate of the Method Detection Limit (data validation qualifier only).

r = Data rejected. The presence or absence of the analyte cannot be verified (data validation qualifier only).

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
B-1	5/1/1998	6	--
	5/23/2000	<0.30	<200
	5/24/2001	<0.3	--
	6/5/2002	<0.3	<200
	5/29/2003	<20	<200
	6/15/2004	<20	<200
	6/20/2005	<5.0	<200
	6/6/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/14/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
B-2	4/29/1998	<500	--
	7/30/1999	<200	<200
	5/23/2000	<200	880
	5/24/2001	LPH	LPH
	5/24/2001	LPH	LPH
	6/5/2002	LPH	LPH
	5/29/2003	130	<200
	6/15/2004	<200	<200
	6/20/2005	LPH	LPH
	6/6/2006	LPH	LPH
	10/23/2006	22.1	<62
	3/14/2007	26.7	<62.0
	9/11/2007	20.2	<62.0
	6/4/2008	6.41	<74.4
	8/27/2008	4.10	<74.4
	8/27/2008 (Dup)	4.19	<74.4
B-3	6/5/2002	LPH	LPH
	6/15/2004	LPH	LPH
	6/20/2005	LPH	LPH
	6/6/2006	LPH	LPH
	10/23/2006	LPH	LPH
	3/14/2007	LPH	LPH
	9/11/2007	LPH	LPH
B-3A	6/4/2008	67.7	<74.4
	8/27/2008	93.6	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
B-4	7/29/1999	<6	<200
	5/23/2000	<1.5	<200
	5/23/2001	<10	<200
	6/5/2002	LPH	LPH
	5/29/2003	<50	<200
	6/15/2004	LPH	LPH
	6/20/2005	LPH	LPH
	6/6/2006	LPH	LPH
	10/23/2006	LPH	LPH
	3/14/2007	LPH	LPH
	9/11/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
B-5	4/29/1998	100	--
	7/29/1999	<2	--
	5/23/2000	<5.0	<200
	5/23/2001	<1.5	<200
	6/5/2002	<5.0	<200
	5/29/2003	<20	<200
	6/15/2004	<50	<200
	6/22/2005	<5.0	<200
	6/6/2006	<0.320	<45.1
	10/23/2006	0.770J	<62
	3/14/2007	1.41	<62.0
	3/14/2007 (dup)	1.53	<62.0
	9/11/2007	<0.310	144
	6/3/2008	0.610J	<74.4
	8/27/2008	<0.420	<74.4
B-6	9/17/1997	<200	<200
	4/29/1998	210	--
	7/29/1999	<3	--
	5/24/2001	<20	--
	6/5/2002	LPH	LPH
	5/29/2003	<50	<200
	6/15/2004	<100	8,400
	6/21/2005	<10	<200
	6/6/2006	<0.320	<45.1
	10/23/2006	0.780J	<62
	3/14/2007	0.540J	<62.0
	9/11/2007	0.470J	<62.0
	6/4/2008	2.31	<74.4
	8/27/2008	0.770J	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
D-4	6/7/2006	<0.320	<45.1
	10/23/2006	--	--
	3/15/2007	<0.310	<62.0
	9/11/2007	Insufficient groundwater to sample	
	6/4/2008	Insufficient groundwater to sample	
	8/26/2008	<0.420	<74.4
D-5	3/14/2007	Insufficient groundwater to sample	
	9/11/2007	Insufficient groundwater to sample	
	6/4/2008	Insufficient groundwater to sample	
	8/26/2008	Insufficient groundwater to sample	
D-6	4/30/1998	0.5	--
	5/23/2000	3.8	<200
	5/23/2001	<10	<200
	6/5/2002	<2.0	<200
	5/27/2003	<0.3	<200
	6/15/2004	<5.0	<200
	6/22/2005	<1.0	<200
	6/7/2006	<0.320	<45.1
	10/23/2006	<0.310	<62
	10/23/2006	<0.310	<62.0
	3/14/2007	0.670J	<62.0
	9/11/2007	0.650J	<62.0
	6/3/2008	0.540J	<74.4
	8/27/2008	0.600J	<74.4
D-7	4/30/1998	12	--
	5/23/2000	<0.3	<200
	5/23/2001	<0.3	<200
	6/4/2002	<0.3	<200
	5/27/2003	<5.0	<200
	6/15/2004	<10	<200
	6/22/2005	<0.3	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/14/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
HA-1	4/29/1998	<0.3	--
	5/24/2000	<0.3	<200
	5/23/2001	<0.3	<200
	6/4/2002	<0.3	<200
	5/28/2003	<0.3	<200
	6/15/2004	<0.3	<200
	6/22/2005	<0.3	<200
	6/7/2006	<0.320	<45.1
	6/7/2006 (Dup)	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/14/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/26/2008	<0.420	75.2J
HA-2	9/18/1997	<100	<10
	5/5/1998	90	<200
	7/30/1999	<6	--
	5/23/2000	<3.0	<200
	5/23/2001	<3.0	<200
	6/4/2002	<3.0	<200
	5/27/2003	<50	<200
	6/16/2004	<20	<200
	6/21/2005	<10	<200
	6/6/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	5.09	<62.0
	9/12/2007	0.480J	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
HA-3	4/30/1998	13	--
	5/23/2000	<0.3	<200
	5/23/2001	<0.3	<200
	6/4/2002	<1	<200
	5/27/2003	<10	<200
	6/15/2004	--	--
	6/22/2005	<1.0	--
	6/7/2006	<0.320	<45.1
	10/23/2006	--	--
	3/15/2007	<0.310	<62.0
	9/12/2007	Insufficient groundwater to sample	
	6/2/2008	Insufficient groundwater to sample	
	8/25/2008	Insufficient groundwater to sample	

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
HA-4	4/30/1998	<1.0	<200
	5/22/2000	<0.3	<200
	5/23/2001	<0.3	<200
	6/4/2002	<0.3	<200
	5/27/2003	<0.3	<200
	6/16/2004	<0.3	<200
	6/22/2005	<0.3	<200
	6/7/2006	--	--
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/26/2008	<0.420	<74.4
HA-5	9/18/1997	5.46	<10,000
	5/1/1998	5	
	7/29/1999	<0.3	<200
	5/22/2000	<0.3	<200
	5/22/2001	<0.3	<200
	6/5/2002	<1.0	<200
	5/28/2003	<5.0	<200
	6/16/2004	<0.3	<200
	6/20/2005	<0.3	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/26/2008	<0.420	<74.4
HA-6	9/17/1997	<200	<100
	5/1/1998	100	--
	7/30/1999	<8	<200
	5/22/2000	<10	<200
	5/22/2001	<10	<200
	6/5/2002	<10	<200
	5/28/2003	<50	<200
	6/16/2004	<50	<200
	6/20/2005	<20	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/26/2008	<0.420	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
HA-7	7/29/1999	<5	<200
	5/22/2000	<5.0	<200
	5/22/2001	<1.5	<200
	6/5/2002	<10	<200
	5/28/2003	<20	<200
	6/15/2004	<50	<200
	6/20/2005	<2.0	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/26/2008	<0.420	<74.4
HA-8	9/18/1997	<10	<10,000
	4/29/1998	12	
	7/29/1999	<0.3	<200
	5/22/2000	<0.3	<200
	5/22/2001	<0.3	<200
	6/5/2002	<0.3	<200
	5/28/2003	<50	<200
	6/15/2004	LPH	LPH
	6/20/2005	LPH	LPH
	6/6/2006	LPH	LPH
	10/23/2006	LPH	LPH
	3/14/2007	LPH	LPH
	9/11/2007	<0.310	<62.0
	6/3/2008	<0.420	<74.4
	8/26/2008	<0.420	<74.4
HA-9	9/18/1997	61.4	<10,000
	4/29/1998	50	<200
	5/24/2000	<0.3	<200
	5/23/2001	<0.3	<200
	6/4/2002	<10	<200
	5/28/2003	<20	<200
	6/17/2004	<5.0	<200
	6/20/2005	<5.0	<200
	6/6/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
HA-10	6/6/2002	<1.5	<200
	6/21/2005	<5.0	<200
	6/6/2006	<0.320	<451
	10/24/2006	<0.310	<45.1
	3/15/2007	<0.310	<62.0
	9/12/2007	Insufficient groundwater to sample	
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
HA-11	4/29/1998	4	--
	5/24/2000	<0.3	<200
	5/23/2001	<1.0	<200
	6/5/2002	4.5J	<200
	5/27/2003	<10	<200
	6/15/2004	--	--
	6/21/2005	<5.0	<200
	6/7/2006	0.880J	<100
	10/24/2006	<0.310	<62
	3/15/2007	0.550J	<62.0
	9/12/2007	Insufficient groundwater to sample	
	6/4/2008	0.890J	<74.4
	8/27/2008	Insufficient groundwater to sample	
HA-12	9/18/1997	<2	<10,000
	5/1/1998	1	<200
	7/29/1999	<0.3	--
	5/22/2000	<0.3	<200
	5/22/2001	<0.3	<200
	6/5/2002	<0.3	<200
	5/28/2003	<0.3	<200
	6/16/2004	<0.3	<200
	6/21/2005	<0.3	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
HA-13	9/18/1997	<2	<10,000
	5/1/1998	<1	<200
	5/22/2000	<0.3	<200
	5/22/2001	<0.3	<200
	6/4/2002	<0.3	<200
	5/27/2003	<10	<200
	6/16/2004	<0.3	<200
	6/21/2005	<0.3	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
HA-14	9/18/1997	15.6	<10,000
	5/1/1998	21	<200
	7/29/1999	<0.3	<200
	5/22/2000	<5.0	<200
	5/22/2001	<0.3	<200
	6/4/2002	<1.5	<200
	5/27/2003	<5.0	<200
	6/16/2004	<1.0	<200
	6/21/2005	<5.0	<200
	6/7/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/15/2007	<0.310	<62.0
	9/11/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	8/27/2008	<0.420	<74.4
W-1	5/23/2000	560	<200
	5/24/2001	LPH	LPH
	6/5/2002	<100	<200
	5/27/2003	<30	<200
	6/16/2004	LPH	LPH
	6/20/2005	<100	<200
	6/7/2006	48.5	134
	10/23/2006	33.6	<62
	3/14/2007	54.9	<62.0
	3/14/2007 (Dup)	46.0	<62.0
	9/12/2007	Insufficient groundwater to sample	
	6/4/2008	70.8	<74.4
	8/27/2008	Insufficient groundwater to sample	

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L
W-2	7/29/1999	<8	--
	5/23/2000	<100	<200
	5/24/2001	40	--
	6/5/2002	LPH	LPH
	5/29/2003	<100	<200
	6/15/2004	<500	<200
	6/22/2005	<50	<200
	6/6/2006	15.6	<45.1
	10/23/2006	21.7	<62
	10/23/2006 (Dup)	18.4	<62
	3/14/2007	6.09	<62.0
	9/11/2007	45.3	<62.0
	6/3/2008	23.2	<74.4
	8/27/2008	24.0	<74.4
W-3	9/18/1997	<1000	<500,000
	4/29/1998	60	<200
	7/30/1999	<3	--
	5/23/2000	<1.5	<200
	5/22/2001	<1.5	<200
	6/4/2002	<5	<200
	5/28/2003	<20	<200
	6/16/2004	LPH	LPH
	6/21/2005	<20	<200
	6/6/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	10/24/2006 (Dup)	<0.310	<62
	3/14/2007	<0.310	<62.0
	9/12/2007	<0.310	<62.0
	6/4/2008	<0.420	<74.4
	6/4/2008 (Dup)	<0.420	<74.4
	8/26/2008	<0.420	<74.4
W-4	4/29/1998	40	--
	7/30/1999	<3	--
	5/23/2001	LPH	LPH
	6/4/2002	<6	<200
	5/28/2003	<10	<200
	6/15/2004	LPH	LPH
	6/21/2005	<10	<200
	6/6/2006	<0.320	<45.1
	10/24/2006	<0.310	<62
	3/14/2007	<0.310	<62.0
	9/12/2007	Insufficient groundwater to sample	
	6/4/2008	0.850J	<74.4
	8/26/2008	1.21	<74.4

TABLE 3

GROUND WATER ANALYTICAL DATA,
METHYL TERTIARY BUTYL ETHER AND ETHANOL
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Monitoring Well	Sample Date	MTBE [1] µg/L	Ethanol [2] µg/L

Notes

[1] Methyl tertiary butyl ether analyzed by EPA Method 8020A (modified) through 2005; beginning in 2006, methy tertiary butyl ether analyzed by EPA Method 8260B

[2] Ethanol per EPA Method 8000A prior to 2006, Method 8260B starting in 2006

Data Qualifiers (analytical laboratory data qualifiers in upper case, data validation qualifiers in lower case)

J or j = Estimated value. The analyte was positively identified, but the associated numerical result is an estimate.

"<" = Concentration less than detection limit listed

µg/L = micrograms per liter

Dup = duplicate sample

EPA = United States Environmental Protection Agency

LPH = liquid phase hydrocarbons present; not sampled

TABLE 4

COMPLIANCE DATA REPORTED FOR KING COUNTY DISCHARGE AUTHORIZATION #264-03
JANUARY 2007 TO JUNE 2009
Former Mobil Bulk Terminal
2423 Lind Avenue SW, Renton, Washington

Month	Benzene (µg/L)	Ethylbenzene (µg/L)	Toluene (µg/L)	Fats, Oils, and Grease (mg/L)	Discharge Volume (gallons)
January 2007					8,416
February 2007					73,074
March 2007	2.32	0.940	0.420	ND	10,503
April 2007					25,383
May 2007					213,409
June 2007					83,621
July 2007					29,430
August 2007					32,041
September 2007					28,458
October 2007	ND	0.570	0.520	1.77	38,078
November 2007					41,938
December 2007					35,101
January 2008					39,724
February 2008					42,133
March 2008					40,719
April 2008	0.540 J	ND	0.330 J	ND	53,227
May 2008					45,073
June 2008					52,285
July 2008					33,769
August 2008					21,478
September 2008					40,353
October 2008					47,280
November 2008	ND	ND	ND	ND	39,275
December 2008					32,064
January 2009					125,808
February 2009					99,610
March 2009					115,596
April 2009					82,732
May 2009	< 0.270	< 0.240	< 0.280	< 0.800	89,981
June 2009					103,305

Notes

Discharge limits are 130 µg/L for benzene, 1,400 µg/L for ethylbenzene, 1,500 µg/L for toluene, and 100 mg/L for fats, oils, and grease.

µg/L = micrograms per liter
mg/L = milligrams per liter
J = estimated
ND = non-detect

Source:
Base Map from USGS Renton, Washington,
7.5 Minute Topographic Quadrangle (1994)

N

0 1,000 2,000

Feet

FIGURE 1

SITE LOCATION MAP

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

AME
Engineers and Earth Scientists
1107 Investment Blvd., #290, El Dorado Hills, California 95762 (916) 939-7550

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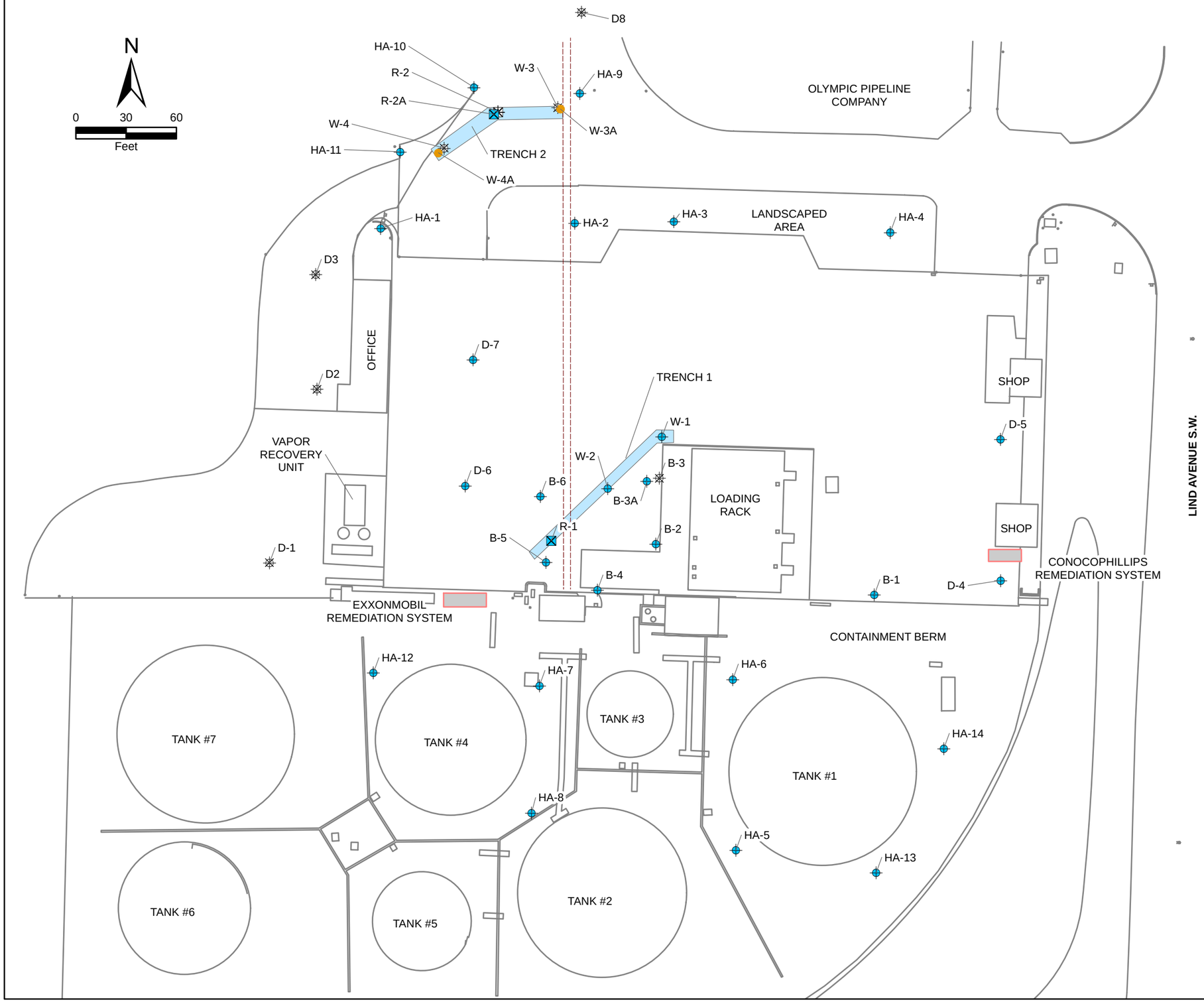

LEGEND

- HA-1 — EXXONMOBIL MONITORING WELL
- R-1 — EXXONMOBIL RECOVERY WELL
- W-3A — TRENCH CLEANOUT RISER
- D-1 — MONITORING WELL DESTROYED
- R-2 — RECOVERY WELL DESTROYED
- OLYMPIC PIPELINE
- RECOVERY TRENCH
- REMEDIATION SYSTEM

Notes:

1. All locations and dimensions are approximate.
2. Base map information and monitoring well location survey data from Secor, 2007.
3. Monitoring well B-3 destroyed and monitoring well B-3A installed November 2007.
4. Recovery well R-2 and wells W-3 and W-4 destroyed in November 2008. Recovery well R-2A and trench cleanouts W-3A and W-4A installed November 2008.
5. Trench 2 as shown is the new configuration following the trench upgrade work in November and December 2008.

FIGURE 2

SITE PLAN

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

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N

0 30 60

Feet

D8

HA-10 [0.00]

R-2

W-3 [0.00]

HA-9 [0.20]

W-4 [0.29]

R-2A

W-3A

HA-11 [0.18]

TRENCH 2

W-4A

OLYMPIC PIPELINE COMPANY

HA-1 [0.00]

HA-2 [0.37]

HA-3 [0.00]

LANDSCAPED AREA

HA-4 [0.00]

D-3 [0.00]

OFFICE

D-2 [0.00]

D-7

TRENCH 1

W-1 [DRY]

W-2 [0.70]

B-3 [1.08]

VAPOR RECOVERY UNIT

D-6

B-6 [1.29]

B-3A

LOADING RACK

B-2 [1.17]

B-5 [0.00]

R-1

D-1 [0.00]

B-4 [0.82]

SHOP

D-5 [DRY]

SHOP

LIND AVENUE S.W.

B-1 [0.07]

D-4 [DRY]

CONOCOPHILLIPS REMEDIATION SYSTEM

EXXONMOBIL REMEDIATION SYSTEM

CONTAINMENT BERM

HA-12 [0.00]

HA-7 [0.00]

HA-6 [0.07]

TANK #7

TANK #4

TANK #3

HA-14 [0.00]

TANK #1

HA-8 [0.00]

HA-5 [0.00]

HA-13 [0.00]

TANK #6

TANK #5

TANK #2

LEGEND

- HA-1 — EXXONMOBIL MONITORING WELL
- R-1 — EXXONMOBIL RECOVERY WELL
- W-3A — TRENCH CLEANOUT RISER
- D-1 — MONITORING WELL DESTROYED
- R-2 — RECOVERY WELL DESTROYED
- OLYMPIC PIPELINE
- RECOVERY TRENCH
- REMEDIATION SYSTEM
- [0.00] — THICKNESS OF LIQUID PHASE HYDROCARBONS IN FEET

Notes:

1. All locations and dimensions are approximate.
2. Base map information and monitoring well location survey data from Secor, 2007.
3. Monitoring well B-3 destroyed and monitoring well B-3A installed November 2007.
4. Recovery well R-2 and wells W-3 and W-4 destroyed in November 2008. Recovery well R-2A and trench cleanouts W-3A and W-4A installed November 2008.
5. Trench 2 as shown is the new configuration following the trench upgrade work in November and December 2008.

FIGURE 3
MEASUREMENTS OF LIQUID PHASE HYDROCARBONS, NOVEMBER 10, 1987

Conocophillips (Former Mobil) Terminal, Renton, Washington

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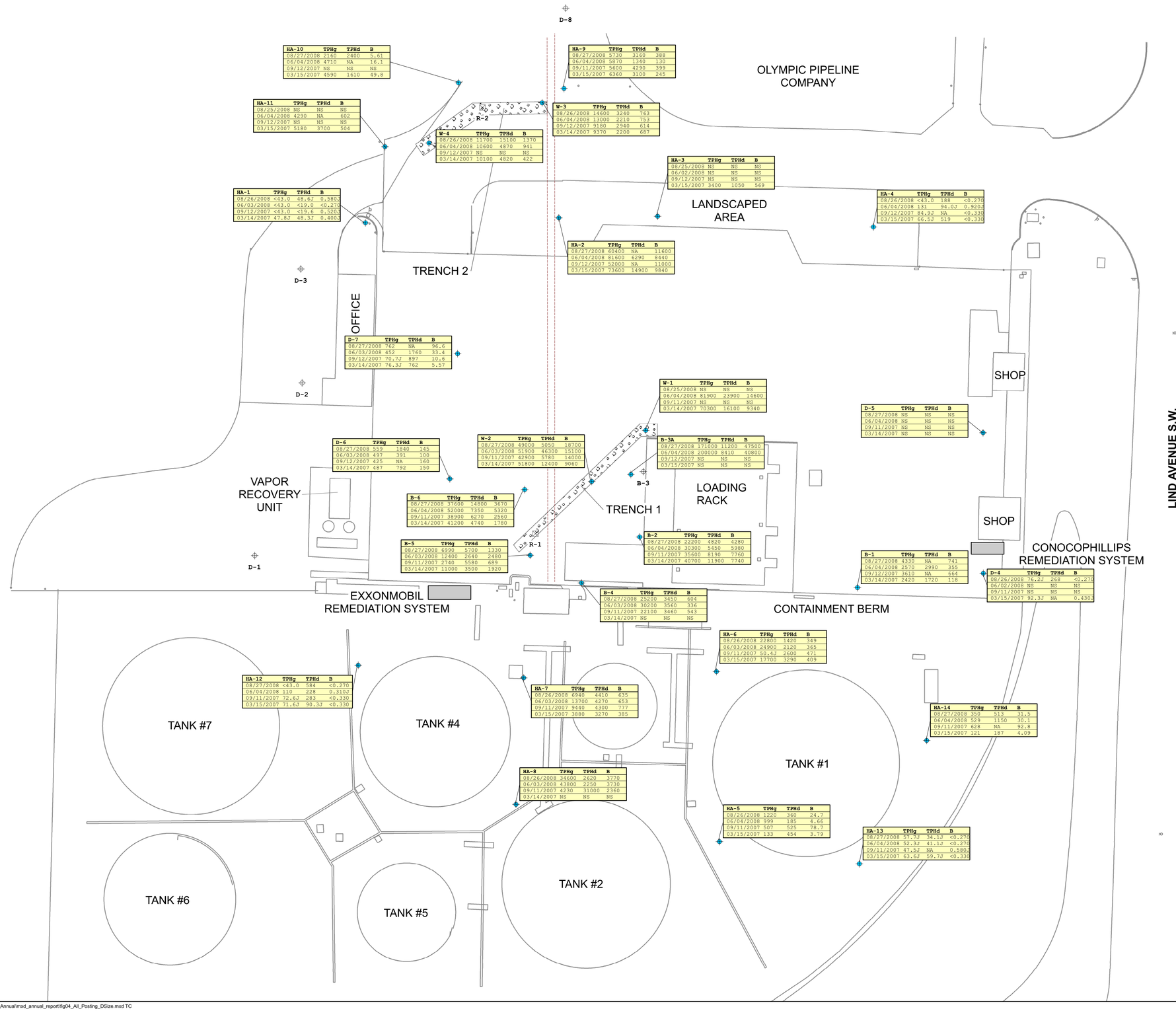

LEGEND

- R-1 — EXXONMOBIL RECOVERY WELL
- HA-1 — EXXONMOBIL MONITORING WELL
- D-1 — DESTROYED EXXONMOBIL MONITORING WELL

SAMPLE LOCATION

HA-1	TPHg	TPHd	B
08/26/2008	<43.0	48.6J	0.580J
06/03/2008	<43.0	<19.0	<0.270
09/12/2007	<43.0	<19.6	0.520J
03/14/2007	47.8J	48.3J	0.400J

CHEMICAL NAME

SAMPLE DATE — CONCENTRATION IN ug/L

- OLYMPIC PIPELINE
- REMEDIATION SYSTEM
- 2 — RECOVERY TRENCH
- TPHg — TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- TPHd — TOTAL PETROLEUM HYDROCARBONS AS DIESEL
- B — BENZENE
- < — LESS THAN METHOD DETECTION LIMIT
- NA — NOT ANALYZED, INSUFFICIENT SAMPLE VOLUME TO PERFORM THE ANALYSIS
- NS — NOT SAMPLED, INSUFFICIENT GROUND WATER IN THE MONITORING WELL TO OBTAIN A SAMPLE
- J — ESTIMATED VALUE (LABORATORY QUALIFIER)
- ug/L — MICROGRAMS PER LITER

N

0 15 30
Feet

Notes:
1. All locations and dimensions are approximate.
2. Where primary and duplicate samples were collected, the greater of the two values is shown.

FIGURE 4
DISSOLVED HYDROCARBON CONCENTRATIONS IN GROUND WATER, 2007 TO 2008

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

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Engineers and Earth Scientists
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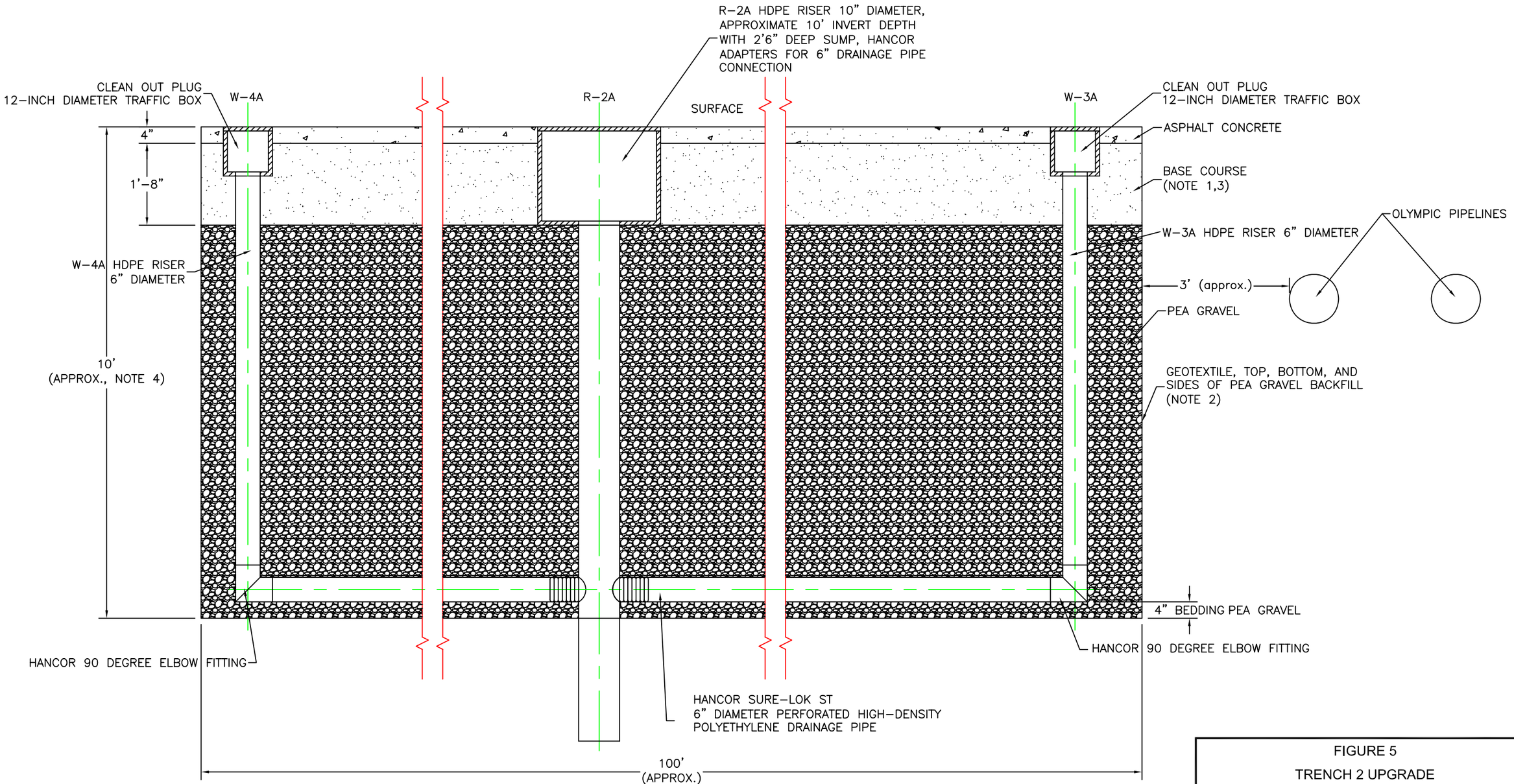

NOTES:
1. MINIMUM COMPACTION OF 90% TESTED PER ASTM D1557/D2922/D3017.
2. ACF 200 WOVEN POLYPROPYLENE GEOTEXTILE. PROTRUDING EDGES OF GEOTEXTILE OVERLAPPED A MINIMUM OF 1 FOOT.
3. 3/4" CLASS 2 AGGREGATE BASE.
4. BASE OF TRENCH EXCAVATED TO TOP OF THE NATIVE SILT/ CLAY SOIL.

0 1 2
Scale (feet)

FIGURE 5

TRENCH 2 UPGRADE
AS-BUILT

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

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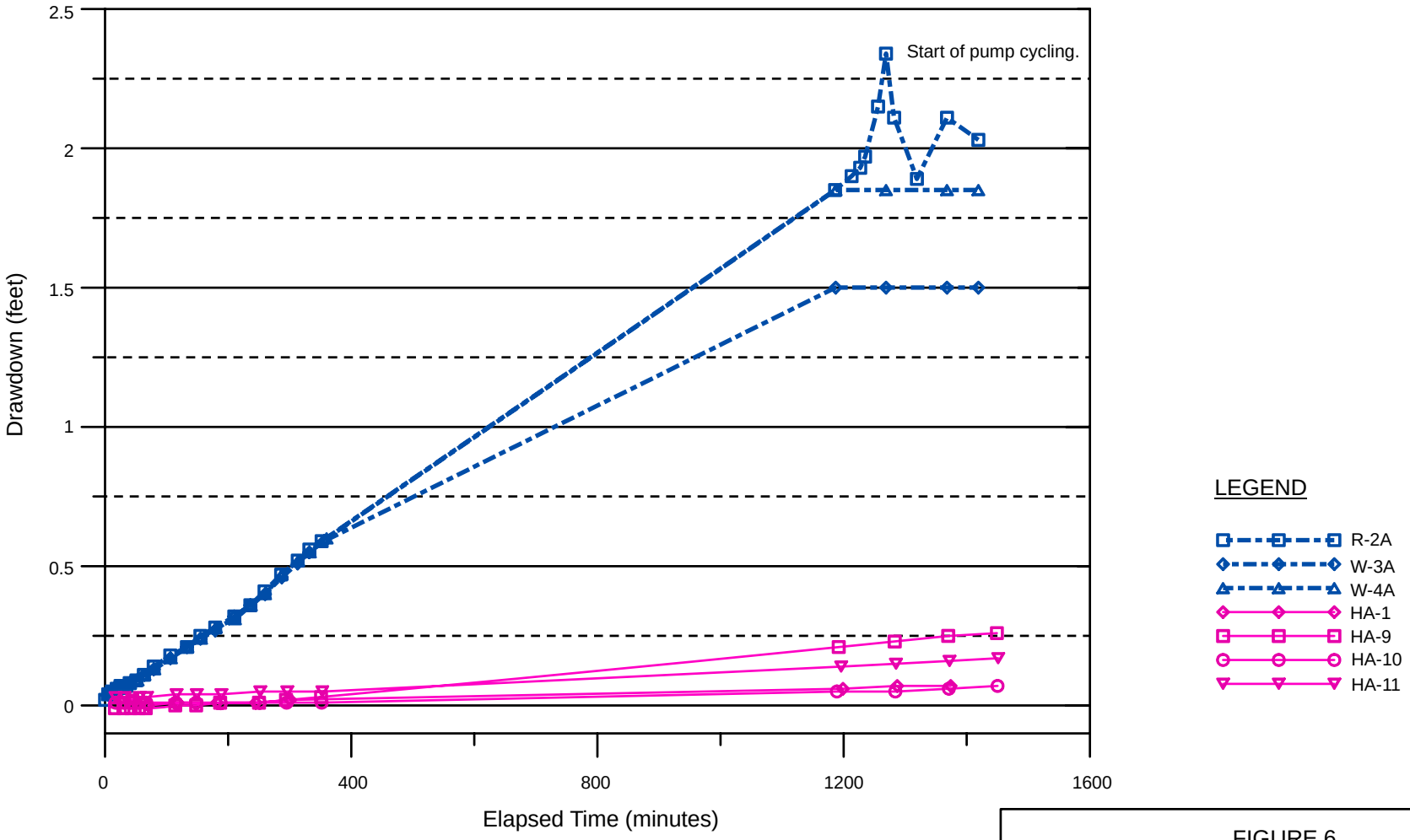

FIGURE 6
TRENCH 2 UPGRADE STARTUP DATA
DECEMBER 17 - 18, 2008

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

AME
Engineers and Earth Scientists
1107 Investment Blvd., #290, El Dorado Hills, California 95762 (916) 939-7550

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APPENDIX A

State Environmental Policy Act Environmental Checklist

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable: Interim Remedial Measure

2. Name of applicant: ExxonMobil Oil Corporation (ExxonMobil)
3. Address and phone number of applicant and contact person:
Joseph A. Abel
1001 Wampanoag Trail
Riverside, RI 02915
(401) 434-7356
4. Date checklist prepared: 6/9/2009
5. Agency requesting checklist: State of Washington, Department of Ecology
6. Proposed timing or schedule (including phasing, if applicable): Start Date: November 1987

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
No.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

None.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No.

10. List any government approvals or permits that will be needed for your proposal, if known.

Puget Sound Air Pollution Control Agency Order to Construct, Install, or Establish.

King County Industrial Waste Program, Major Discharge Authorization

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

A subsurface petroleum recovery and ground water extraction and treatment system was installed by ExxonMobil in response to the State of Washington's Enforcement Order No. DE 87-N301 issued in 1987. The system consists of two subsurface recovery trenches with a recovery well in each trench. A total fluids pump and product recovery pump was installed in each recovery well. Product is pumped to an onsite storage tank for disposal, and total fluids are pumped through an oil/water separator and then through an air stripping tower for treatment prior to discharge to the site's wastewater collection system. The system has been in operation from 1987 to the present.

Ecology, ExxonMobil and ConocoPhillips are presently entering an Agreed Order under the Model Toxics Control Act (MTCA). This SEPA checklist is being done in accordance with the implementation of ExxonMobil's (and ConocoPhillip's) remedial systems under a MTCA interim action to be formalized in the Agreed Order.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

ConocoPhillips – Renton Terminal
2423 Lind Avenue SW
Renton, WA 98053
King County

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

a. General description of the site (circle one): Flat, ~~rolling, hilly, steep slopes, mountainous, other . . . . . .~~

b. What is the steepest slope on the site (approximate percent slope)? Does not apply.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

Sand and clay.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Does not apply.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Does not apply.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Does not apply.

a. **Air**

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Benzene, toluene, ethylbenzene, and xylenes less than 15 pounds per day in accordance with the Puget Sound Air Pollution Control Agency Order of Approval to Construct, Install, or Establish.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Does not apply.

3. **Water**

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Wetlands to the west of the property flow to the Green River.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes. A recovery trench was installed 50 feet to the southeast of the wetlands at the northwest boundary of the site.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Does not apply.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

Yes. Storm water runoff flowing in the drainage ditch near the recovery trench at the north end of the site was diverted around the trench area during construction.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

Ground water is pumped from the recovery trenches as part of the remedial process.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. Does not apply.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

No runoff from the product recovery and ground water extraction system; aboveground equipment inside berm and covered by roof

2) Could waste materials enter ground or surface waters? If so, generally describe.

Aboveground equipment located within bermed area to prevent release of waste materials.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Not applicable.

4. **Plants**

a. Check or circle types of vegetation found on the site: No vegetation on terminal property.

———— deciduous tree: alder, maple, aspen, other

———— evergreen tree: fir, cedar, pine, other

———— shrubs

———— grass

———— pasture

———— crop or grain

———— wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

———— water plants: water lily, eelgrass, milfoil, other

———— other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

None.

c. List threatened or endangered species known to be on or near the site.

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Does not apply.

5. **Animals**

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:
None known.

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site. None known.

c. Is the site part of a migration route? If so, explain.

None known.

d. Proposed measures to preserve or enhance wildlife, if any:

None.

6. **Energy and natural resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electric power for product and water pumps and air stripper blower motor.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None.

7. **Environmental health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Potential exposure of volatile organic compounds to workers operating and maintaining the product recovery and ground water extraction and treatment system

1) Describe special emergency services that might be required.

None.

2) Proposed measures to reduce or control environmental health hazards, if any:

Workers receive 40-hour hazardous waste worker (Hazwoper) safety training. Personal protective equipment as required by the Site Specific Health and Safety Plan, Work area gas testing in accordance with work permit policies and procedures.

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Previous short-term noise from construction of recovery trenches (8:00 am to 5:00 pm). On-going noise from operation of remediation equipment, but remediation equipment noise will not be distinguishable from other facility operations at the facility boundaries.

3) Proposed measures to reduce or control noise impacts, if any:

None.

8. **Land and shoreline use**

a. What is the current use of the site and adjacent properties?

Petroleum products distribution terminal.

b. Has the site been used for agriculture? If so, describe.

No.

c. Describe any structures on the site.

Above-ground storage tanks, truck loading rack, office building.

d. Will any structures be demolished? If so, what?

No.

e. What is the current zoning classification of the site?

Industrial.

f. What is the current comprehensive plan designation of the site?

Does not apply.

g. If applicable, what is the current shoreline master program designation of the site?

Does not apply.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

None known.

i. Approximately how many people would reside or work in the completed project?

Does not apply.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Does not apply.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: Does not apply.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Does not apply.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Does not apply.

c. Proposed measures to reduce or control housing impacts, if any:

Does not apply.

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

With a height of approximately 20 feet, the tallest component of the product recovery and ground water extraction and treatment system is the air stripper tower, the height of which is less than existing petroleum product storage tanks.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

Does not apply.

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Does not apply.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

Does not apply.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

None known.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

Does not apply.

13. **Historic and cultural preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

None known.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None known.

c. Proposed measures to reduce or control impacts, if any:

Does not apply.

14. **Transportation**

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Site access is via existing driveway connection to Lind Avenue SW.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

Does not apply.

c. How many parking spaces would the completed project have? How many would the project eliminate?

Does not apply.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Does not apply.

g. Proposed measures to reduce or control transportation impacts, if any:

Does not apply.

15. **Public services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No,

b. Proposed measures to reduce or control direct impacts on public services, if any.

Does not apply.

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, ~~septic system, other~~.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity; Puget Sound Energy; Installation of electrical line branches from existing site electrical service.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: .....

Date Submitted: .....

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Emissions from air stripper will be in compliance with Puget Sound Air Pollution Control Agency Order of Approval to Construct, Install, or Establish.

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Not applicable.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Not applicable.

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Not applicable.

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Not applicable.

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Not applicable.

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

Not applicable.

APPENDIX B

Manual for Original Product Recovery and Ground Water Extraction and Treatment System

HARTCROWSER

Earth and Environmental Technologies

Operation and Maintenance Manual
Subsurface Petroleum Recovery System
Mobil Bulk Storage Facility
Renton, Washington

J-1784-02

J-1784-02

CONTENTS

J-1784-02

OPERATION AND MAINTENANCE MANUAL
SUBSURFACE PETROLEUM RECOVERY SYSTEM
MOBIL BULK STORAGE FACILITY
RENTON, WASHINGTON

INTRODUCTION

The subsurface petroleum recovery system installed at the Renton Bulk Storage Facility is designed to recover free petroleum product (product) which exists beneath the storage facility. In general, the system consists of two gravel-filled trench drains positioned to intercept the natural groundwater flow. A recovery well is located in each trench drain. Fluid is extracted by two pumps within each well. One pump extracts water, drawing down the fluid levels within the trench drain. The water pump maintains the groundwater level within the trench at a lower level as compared with the area adjacent to the trench. This causes groundwater and free product to flow into the trench and recovery well. A second pump, equipped with a skimmer inlet, extracts product floating on the water surface.

Groundwater extracted from the wells is pumped to a gravity oil/water separator, through an air stripping unit, and discharged into the facility clarifier. The oil/water separator is provided as an emergency backup system to protect against product passing through the air stripping unit. The oil/water separator is equipped with a product sensor probe. If product is detected within the separator, a signal is sent from the probe to the control panel to shut the pumping system down. Product pumped from each well is combined, passed through a flow meter, and emptied into the facility 15,000-gallon storage tank.

MAINTENANCE SCHEDULE

Recommended maintenance checks and activities are summarized below. We recommend a logbook be maintained with all maintenance observations and readings recorded in the log. Consult the main text of the manual for specific details regarding the items summarized below.

Daily Monitoring:

- Read and record product meter.
  Note unusual increase or decrease in rate of product recovery.
- Observe HIGH WATER indicator light.
- Observe HYDROCARBON indicator light.

Weekly Monitoring:

- Measure and record volume of product in recovery tank. Compare change in volume to volume recorded by meter for same period.
- Read and record Air Stripper temperature and pressure.

Monthly Monitoring:

- Observe and time Hydropurge and Petropurge pump operating cycles. Adjust pumps as required.
- Observe oil/water separator. Clean as required.

Quarterly Monitoring:

- Sample influent to and effluent from the air stripper. Test samples for soluble Hydrocarbon concentrations. Sampling should be conducted

BETX 8020

by a qualified technician and the samples should be tested at a certified laboratory.

SYSTEM COMPONENTS

The recovery system components are shown on Figure 1. The system components consist of a control panel, wells and pumps, piping between the wells and treatment area, oil/water separator, and air stripper.

Control Panels

The recovery system control panels are located at the east end of the treatment system concrete slab as indicated on Figure 1. The layout of the panels is shown on Figure 2.

Pump Control Panel

The Pump Control Panel is located as shown on Figure 2. The face of the panel is shown on Figure 3. The Hydro 1 and Petro 1 correspond to pumps installed in well R-1 and Hydro 2 and Petro 2 correspond to pumps installed in well R-2. The Hydro designation indicates the water pump (Hydropurge) while the Petro designation indicates the product pump (Petropurge). Each of the features on the panel are described below.

Pump on - The corresponding pump is operating when the green indicator light is lit. The Petropurge (Petro 1 or Petro 2) pump is equipped with a delayed activation switch. When sufficient product is detected for Petropurge operation, the green indicator light will flash for approximately 30 seconds prior to pump activation. This feature is intended to prevent rapid on/off cycling of the Petropurge pump.

Auto - The corresponding pump cycles on and off as dictated by water and/or product levels detected by the sensor probe. <u>This is the normal operating position</u>.

Off - The corresponding pump is not operating.

Man - The corresponding pump is operating.

Water Shutdown - The water level in the corresponding well is above the Petropurge intake when the red indicator light is lit.

Tank Full - The product storage tank is full when the amber indicator light is lit (the Renton facility recovery system is not equipped with a product level detector).

Auxiliary Control Panel

The Auxiliary Control Panel is located as shown on Figure 2. The face of the panel is shown on Figure 4. This panel provides controls for the Transfer Pump and the Air Stripper blower. Each of the features on the panel are described below.

Transfer Pump - The blue indicator light is lit when the Transfer Pump is operating.

Hand - The Transfer Pump is operating.

Off - The Transfer Pump is off.

Auto - The Transfer Pump is controlled by the float switch in the oil/water separator. <u>This is the normal operating position</u>.

Blower - The blue indicator light is lit when the Air Stripper blower is operating.

Off - The Blower is off.

On - The Blower is on. This is the normal operating position.

High Water - In the event of a malfunction in the Transfer Pump or its float switch or if the Hydropurge pumps flow rate exceeds that of the Transfer Pump, a backup float switch in the oil/water separator shuts down the Hydropurge pumps. This condition is indicated when the red indicator light is lit. This light should be observed on a daily basis.

Hydrocarbon - In the event product is detected in the oil/water separator, the Hydropurge pumps are shut down. This condition is indicated when the red indicator light is lit. This light should be observed on a daily basis.

Circuit Breaker Panel

The Circuit Breaker Panel is located as shown on Figure 2. The interior face of the panel is shown on Figure 6. Breaker switches correspond to the items as labeled.

Pumps

Hydropurge/Petropurge

The Hydropurge and Petropurge pumps are part of the NEPCCO Petropurge System. The pumps and their operation are described on pages A-1 through A-6 of Appendix A. Installation and operation of the Petropurge System are described on pages A-7 through A-42 of Appendix A. The Hydropurge pump is Model No. SP2-7. The Petropurge is a one-third HP pump.

The operation of the Hydropurge pumps should be monitored using the following procedure.

1) Once per month, observe and record the length of time of the on and off cycles of the Hydropurge pumps. This can be done by observing the indicator lights on the Pump Control Panel.

2) If the Hydropurge pumps are completing an on/off cycle in less than 5 minutes, the pump flow rate should be throttled down using the gate valve on the Hydropurge line shown on Figure 8. In no case should the Hydropurge flow rate be less than 5 gallons per minute. (The flow rate may be checked by observing the water level in the oil/water separator when one of the Hydropurge pumps is operating and the Transfer pump is off. An increase in water level in the separator of 1 inch in one minute is approximately 5 gallons per minute.) Alternatively, the Petropurge pump may be lowered, but in no case should the Petropurge inlet be more than 11.0 feet below the top of the well casing in R-1 or 7.4 feet below the top of the well casing in R-2 (the flow rate and pump depths given above are the values set at start up of the recovery system, see Figure 5). These minimum levels are required to maintain sump capacity for cooling of the Hydropurge pumps.

3) If the Hydropurge pumps do not complete a single "on" cycle within a 30-minute period, the water level in the corresponding well should be checked and compared with the level of the Petropurge inlet. If the water level is above the Petropurge inlet, the flow rate of the Hydropurge pump should be increased by opening the gate valve as shown on Figure 8. The maximum flow rate of the Hydropurge pump is 14 gallons per minute. If, at the maximum flow rate, the water level is still above the Petropurge inlet (at steady-state conditions, i.e., after a period of several days), then raise the Petropurge pump until the inlet is just above the water level.

4) If the flow rate of either Hydropurge pump has been adjusted, the flow rate of the Transfer pump may require adjustment. With both Hydropurge pumps operating, turn on the Transfer pump and adjust the flow rate with the ball valve beyond the pump. The flow rate of the Transfer pump should be adjusted so that there is a very gradual fall in the

water level in the Oil/Water Separator when both Hydropurge pumps are operating. Observe the operation of all pumps in the Auto mode for at least one full cycle after any adjustments.

Transfer Pump

The Transfer Pump is mounted on the concrete slab between the Oil/Water Separator and the Air Stripper. This pump is a one-third HP centrifugal pump. Specifications and instructions for the pump are given on pages A-43 through A-51 of Appendix A.

The purpose of this pump is to transfer water from the Oil/Water Separator to the Air Stripper. During normal operation (Auto setting), the Transfer Pump is controlled with a float switch in the Oil/Water Separator. In the event of a malfunction in either the float switch or the Transfer Pump or if the Hydropurge flow rate exceeds the flow rate of the Transfer Pump, a secondary float switch shuts down the Hydropurge pumps and activates the indicator light on the Auxiliary Control Panel. The Transfer Pump flow rate should be adjusted as required and as discussed in the Hydropurge/Petropurge section.

Well Head

A concrete vault with steel lid is located at the top of each well. The typical configuration of the equipment within the well-head vault is shown on Figure 7.

Piping

Piping from each recovery well follows the routes shown on Figure 1. All of the piping leads to a common area near the control panel. A piping detail for the portion above ground is shown on Figure 8. In addition, a sample port with ball valve is located in the product line prior to entering the storage tank, near the southwest corner of the loading racks.

The product meter should be read and recorded on a daily basis. The purpose of this reading, in addition to documenting the amount of product recovered, is to monitor activity of the Petropurge pump. If an unusual increase in the rate of product recovery is observed, this is likely an indication of a malfunction in the Petropurge system. Regular monitoring of the flow meter will help prevent accidental overfill of the recovery tank.

The product recovery tank should be monitored on a weekly basis or as required. The level of product and water should be measured and the amount of product estimated. The amount of product increase in the tank since the last measurement should be compared to the amount recorded by the flow meter during the same period. Because the tank has other sources of fluid water and/or products besides the recovery system, the two values may not agree. However, the actual amount of product recovered should not be greater than the amount in the tank. Flow meter volumes more than 10 percent greater than volumes estimated in the tank may be an indication that adjustments are required in the Hydropurge probe.

Oil/Water Separator

The Oil/Water Separator is located as shown on Figure 1. A cut-away view of the Oil/Water Separator (looking northwest) is shown on Figure 9. The purpose of the Oil/Water Separator is to collect product inadverently pumped through the Hydropurge pumps prior to passage through the air stripper. Replacement or cleaning of the packing and costly maintenance are required if product passes through the air stripper. The Hydropurge pumps are not designed to pump free product. As such, this condition is considered to be a malfunction and the Hydropurge pumps are shut down. The red indicator light on the Auxiliary Control Panel will be lit if this condition occurs.

The Oil/Water Separator has a capacity of approximately 100 gallons. At typical flow rates of 3 to 10 gallons per minute, approximate retention times are 10 to 30 minutes.

Within the Oil/Water Separator are two float switches and a hydrocarbon sensor. One float switch operates the Transfer Pump and maintains the water level in the Oil/Water Separator within recommended limits. The second float switch shuts the Hydrogpurge system off in case of a malfunction in the Transfer Pump or float switch, or if the Hydropurge flow rate exceeds the Transfer Pump flow rate. The hydrocarbon sensor in the separator is able to detect a minimum thickness layer of 1/8 inch. This corresponds to approximately 1/3 gallon.

The interior of the Oil/Water Separator should be inspected approximately once a month. The float switches and product sensor should be cleaned of scum buildup to ensure proper operation. An absorbent pad should be used to remove the buildup of the product film on the water surface.

Air Stripper

The Air Stripper is located at the west end of the treatment system concrete slab as shown on Figure 1. The Air Stripper is shown on Figure 10. Water passes from the Transfer Pump to the top of the stripping tower. The water trickles downward through the packing while air from the blower passes upward. Water flows by gravity out of the bottom. Effluent concentrations of soluble hydrocarbons are expected to be 15 ppb or less.

The viewport on the front of the stripping tower allows visual observation of the condition of the internal packing. Depending upon the rate of buildup of deposits on the packing, cleaning of the packing may not be required. The air pressure in the stripper should be monitored on a weekly basis. A rise in the pressure is indicative of excessive buildup and cleaning is required. Bacterial growth on the packing may be removed with a chlorine treatment of the influent. Inorganic deposits (e.g., iron) may require acid treatment for removal.

Two sample ports are provided on the back of the stripping tower near the blower. These ports are provided to sample effluent to test for soluble hydrocarbon concentrations. Effluent and influent hydrocarbon

concentrations should be determined on a quarterly basis to monitor the stripper performance. A thermometer is provided on the stripper to monitor water temperature. The water temperature influences the efficiency of the stripper at removing soluble hydrocarbons. The temperature in the stripper should be monitored on a weekly basis.

Manufacturer supplied information for Air Stripper components are given on pages A-52 through A-54 of Appendix A.

WARRANTY

The following warranty, between SAVA, Inc., and Hart Crowser, Inc., is hereby passed through to Mobil Oil Corporation.

Subcontractor (SAVA, Inc.) warrants that all materials and services are free from defect in material or workmanship and conform strictly to the specifications of the drawings or samples specified or furnished, subject to the following requirements and limitations.

- For a period of six months following completion of construction, Subcontractor will repair or replace, at no expense to Hart Crowser or Client, any and all defects in Subcontractor's workmanship or materials specified by and supplied by Subcontractor.

- For materials provided by Subcontractor which were explicitly specified by Hart Crowser or Client as to specific manufacturer or specific model, Subcontractor will pass through any and all warranties provided by the manufacturer.

Warranties supplied by manufacturers are included with the corresponding materials in Appendix A.

This warranty is valid for the supplied recovery system only. Any modification to the recovery system shall void the warranty.

HFC:sek
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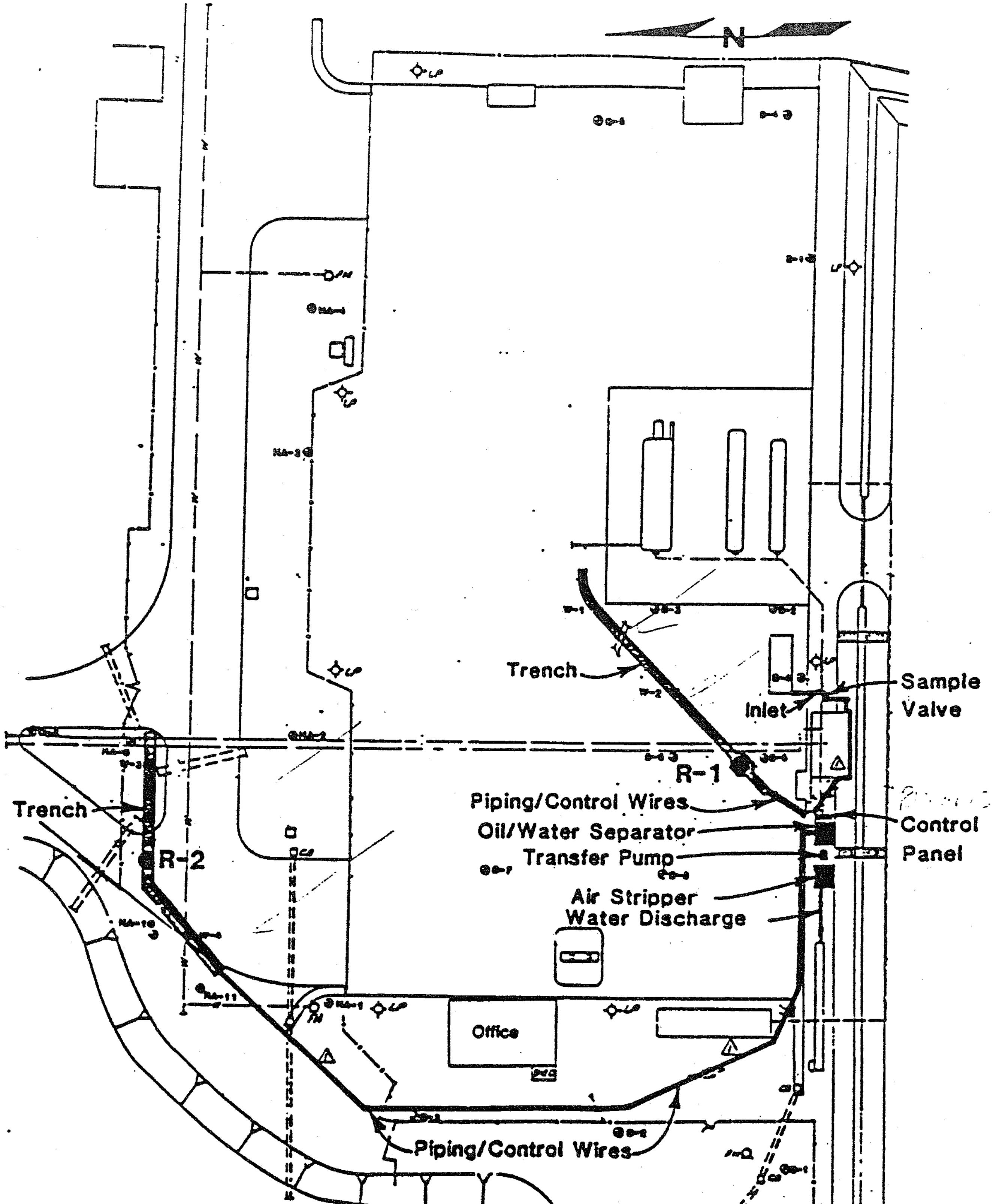
Site Plan



SITE PLAN BASED ON

- "Plot Plan, Mobil Oil Corporation, Renton Terminal," Ryan & Howarth Co. Drawing No A-207, 11-14-67
- "Plot Plan, Renton Bulk Terminal," Mobil Oil Corporation, Drawing No. D-28363, 2-23-71
- Visual Site Survey Including Hand Taping and Pacing to Locate Surface Features

The Location of the Features Shown Should be Considered Accurate to the Degree Implied by the Method Used

J-1784-02 As-Built 12/3/87

Control Panel Layout

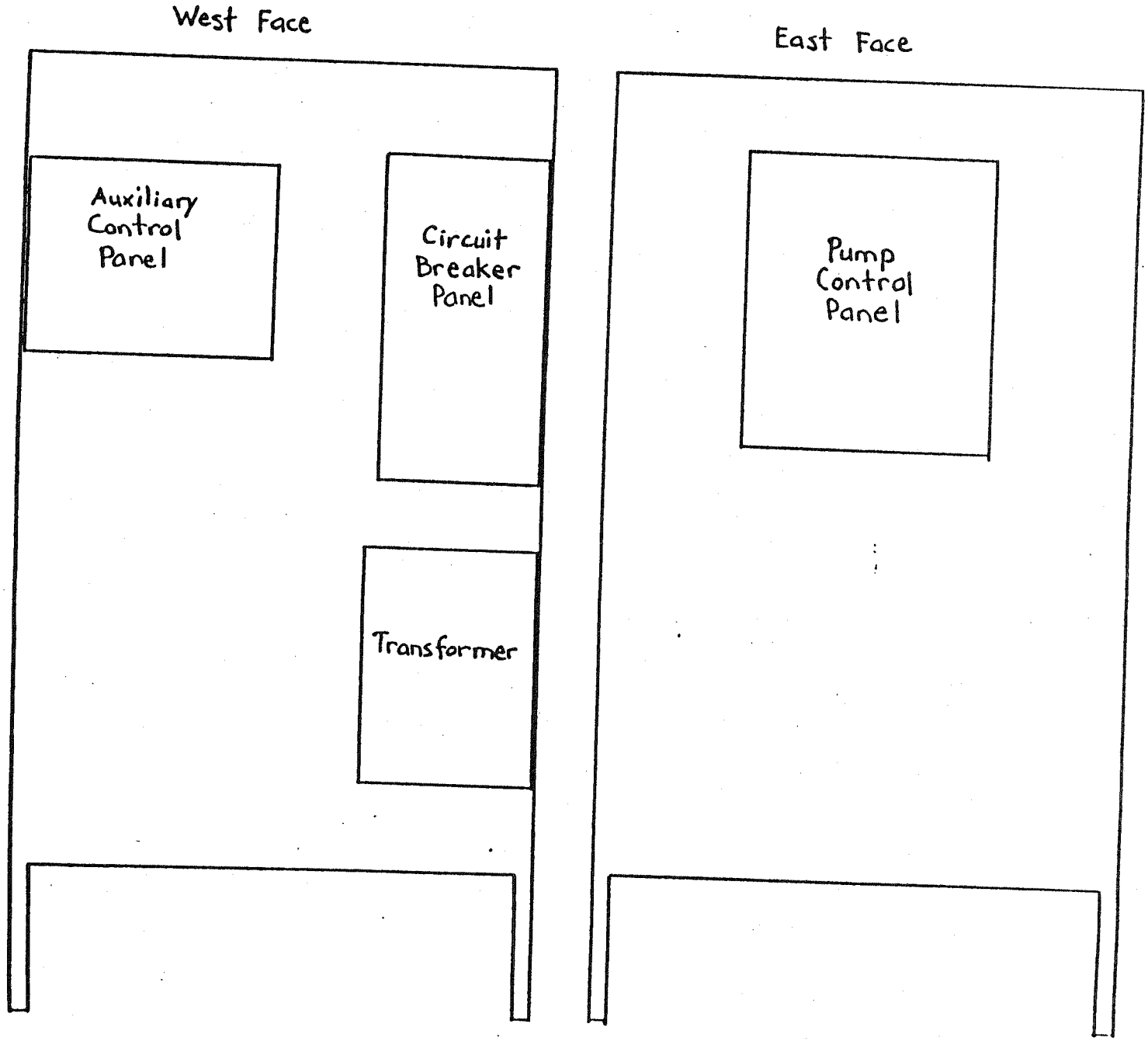
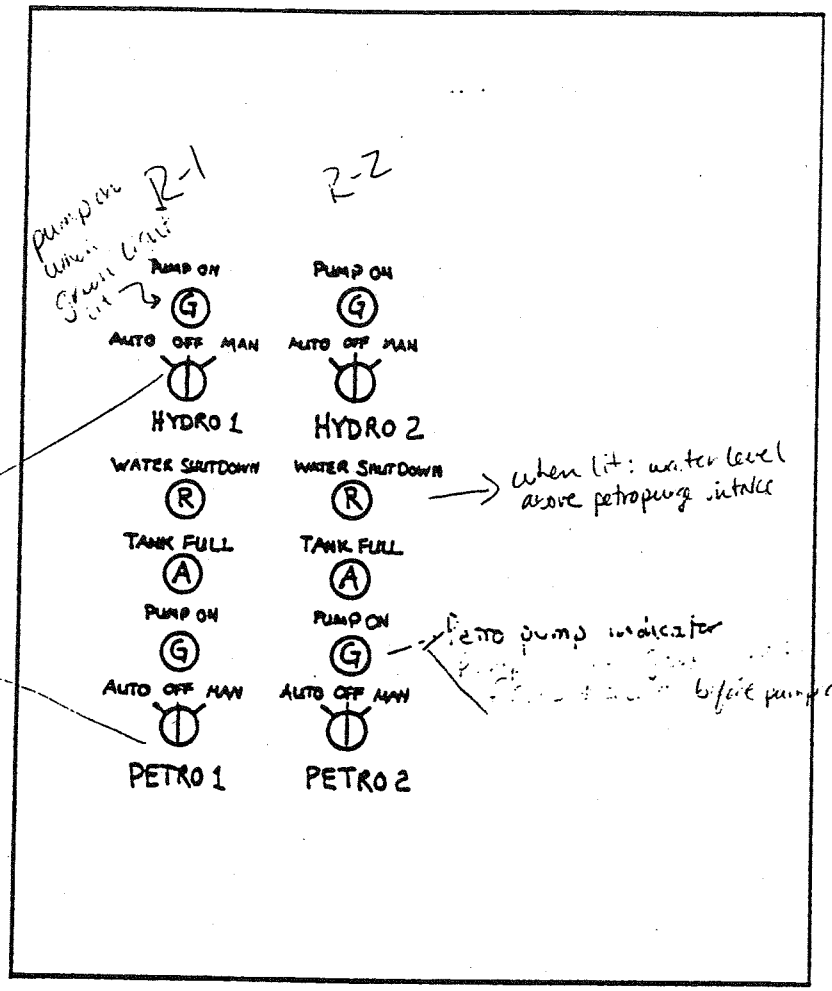


Figure 2

Pump Control Panel



(G) Green Indicator Light
(A) Amber Indicator Light
(R) Red Indicator Light
(I) Control Switch

Figure 3

Auxiliary Control Panel

Transfer Pump / Air Stripper Blow

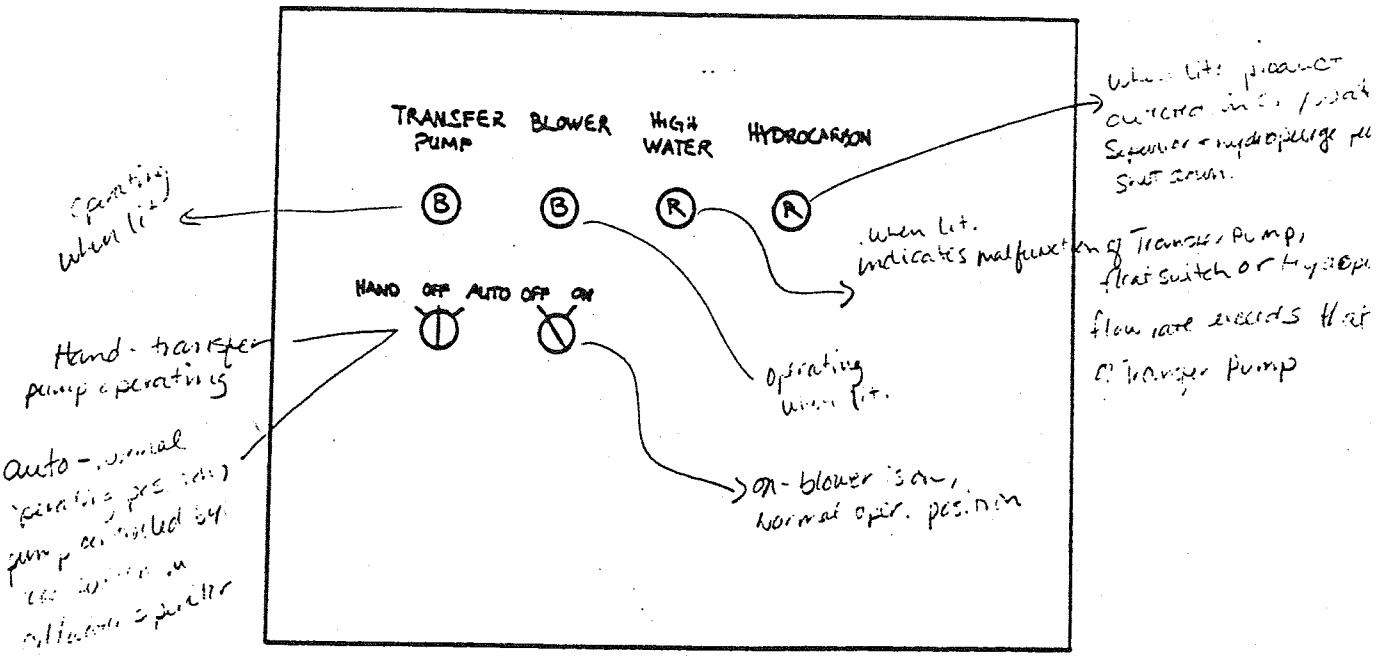
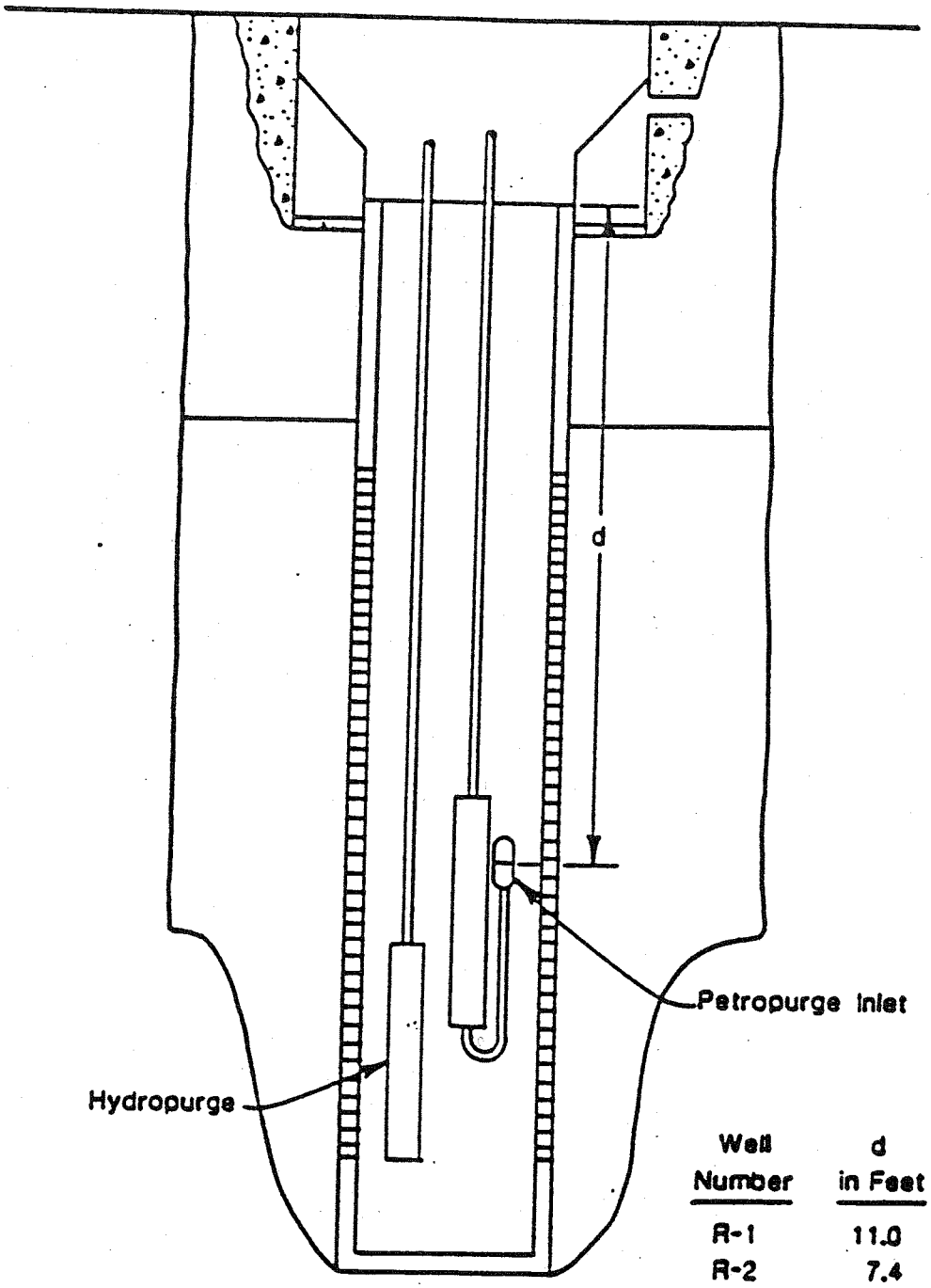


Figure 4

Well Detail



Well Number	d in Feet
R-1	11.0
R-2	7.4

Figure 5

Circuit Breaker Panel

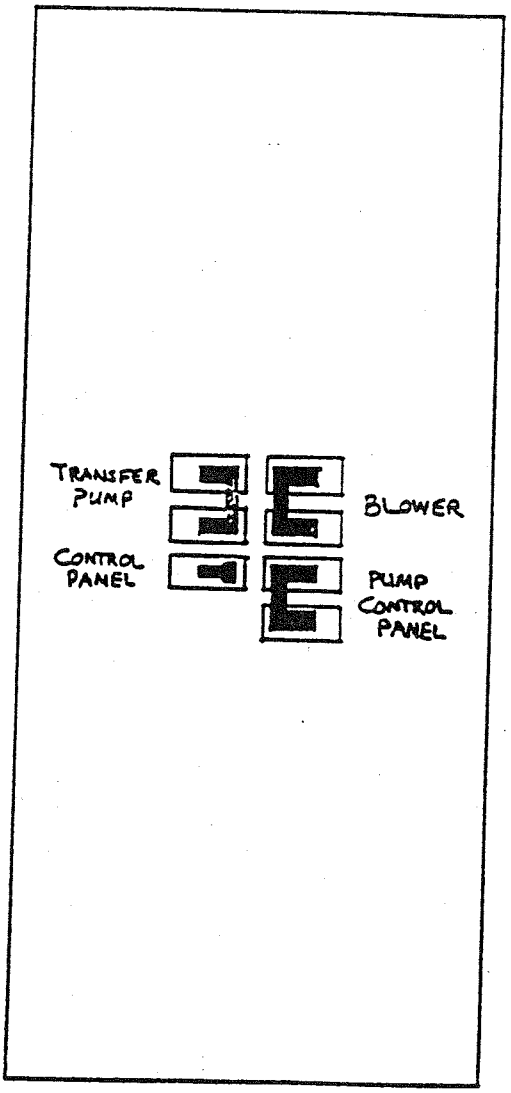


Figure 6

Well Head Vault

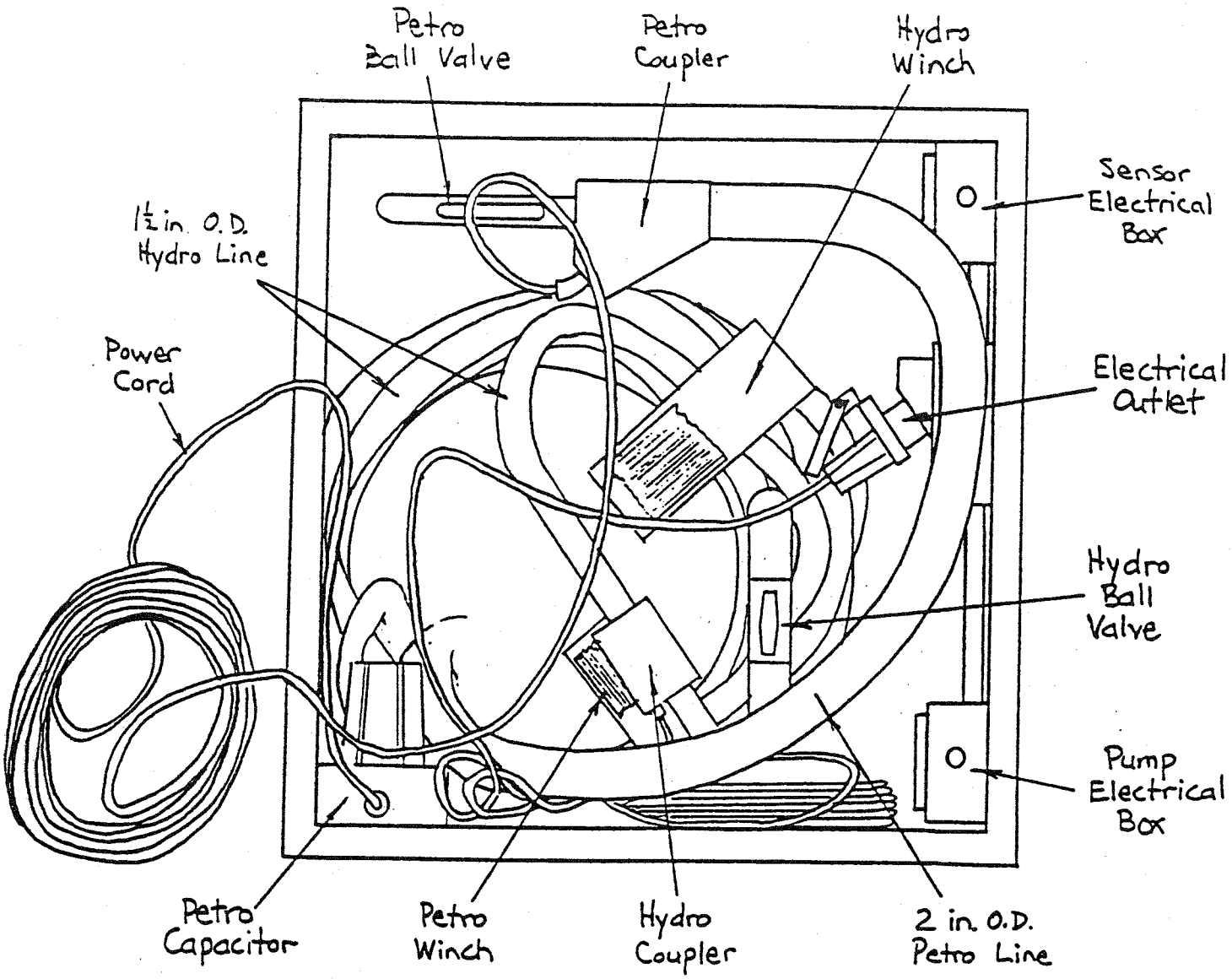


Figure 7

Piping Detail

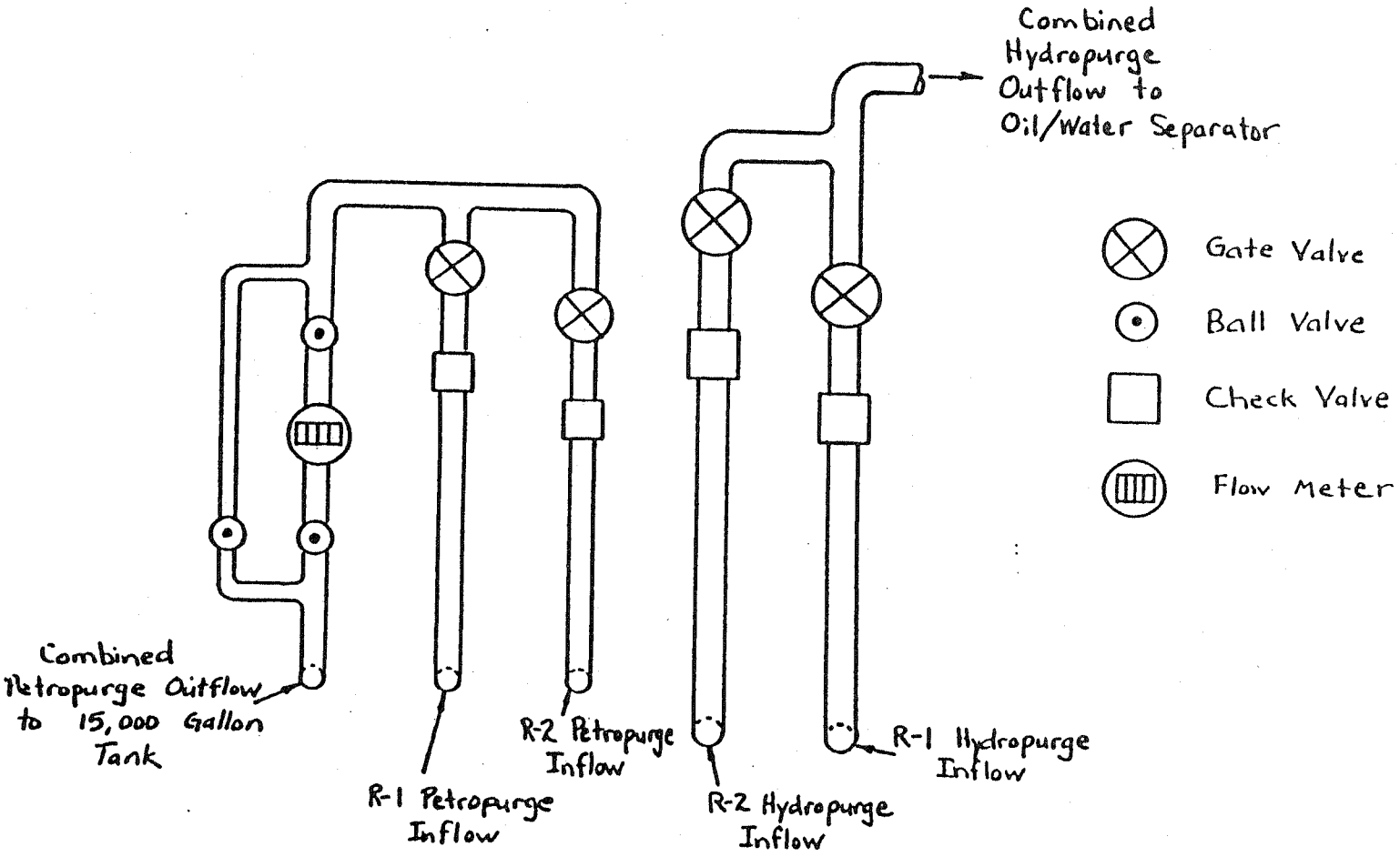


Figure 8

Oil/Water Separator

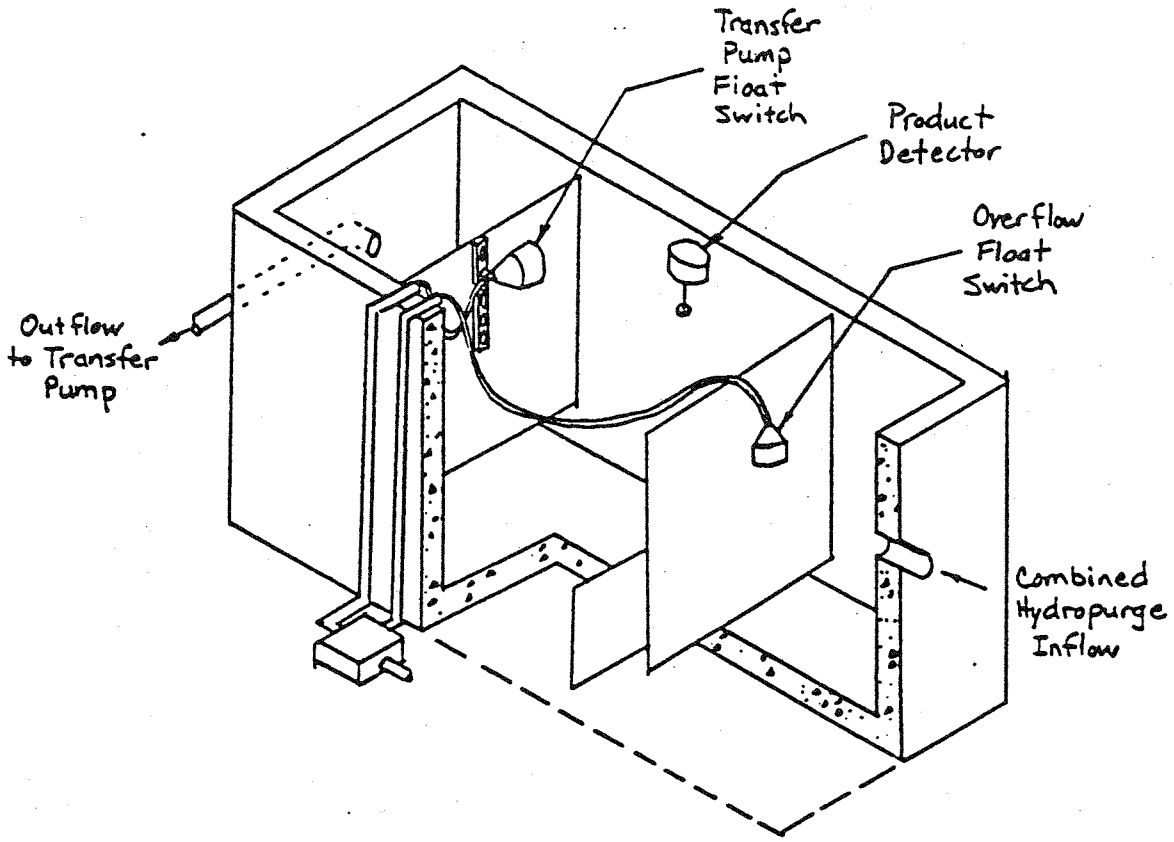
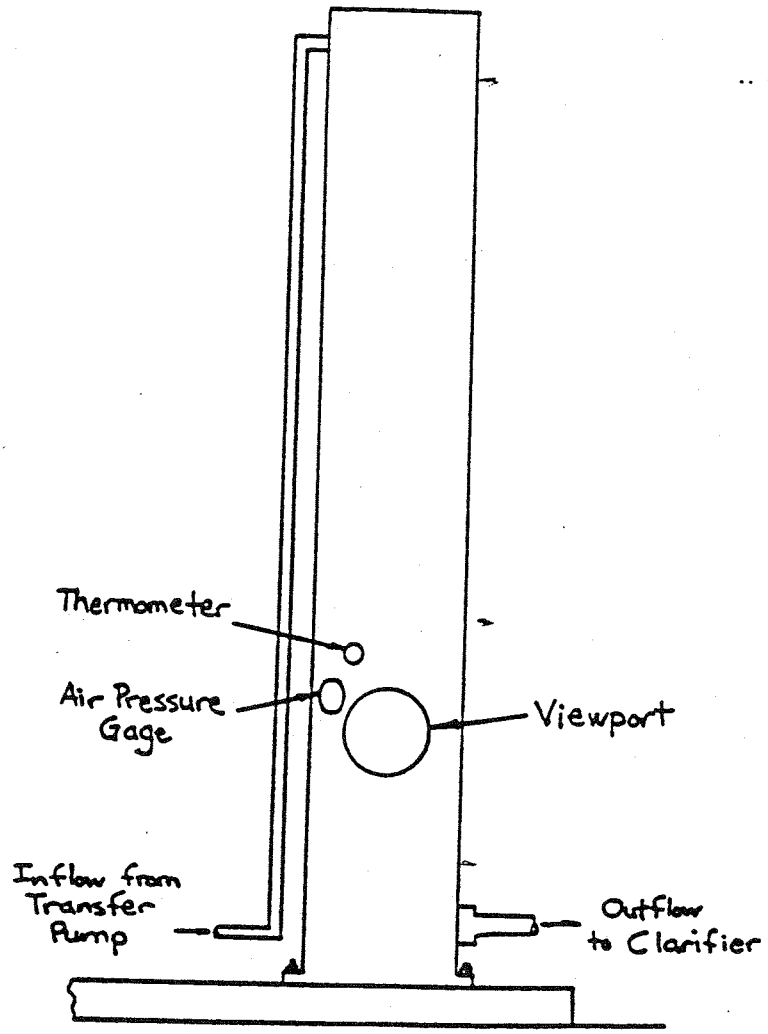
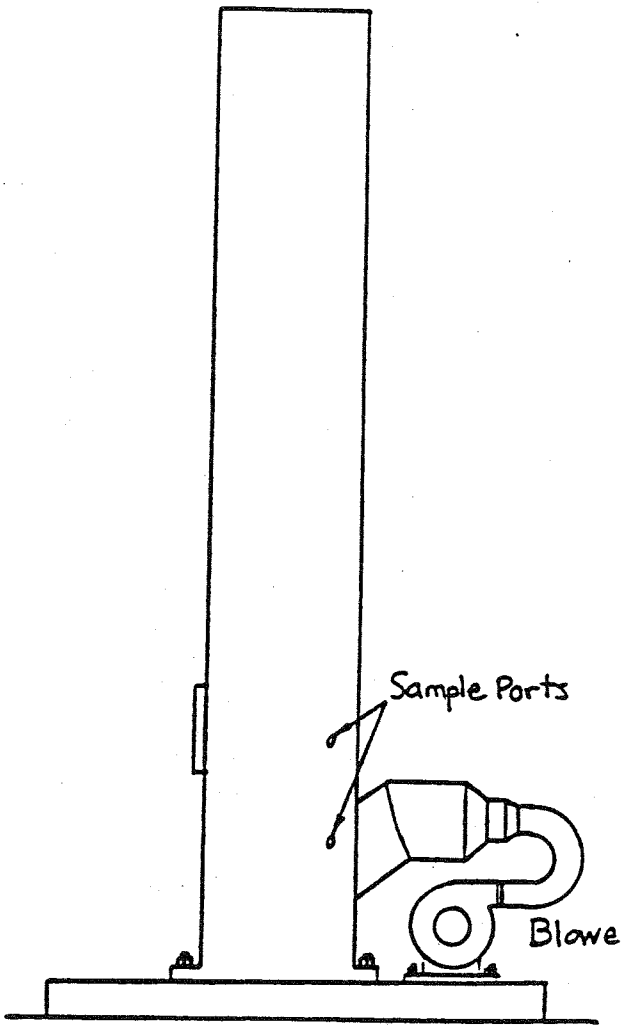


Figure 9

Air Stripper



North Elevation



West Elevation

Figure 10

J-1784-02

APPENDIX A
MANUFACTURER'S LITERATURE

Manual for the PETROPURGE SYSTEM

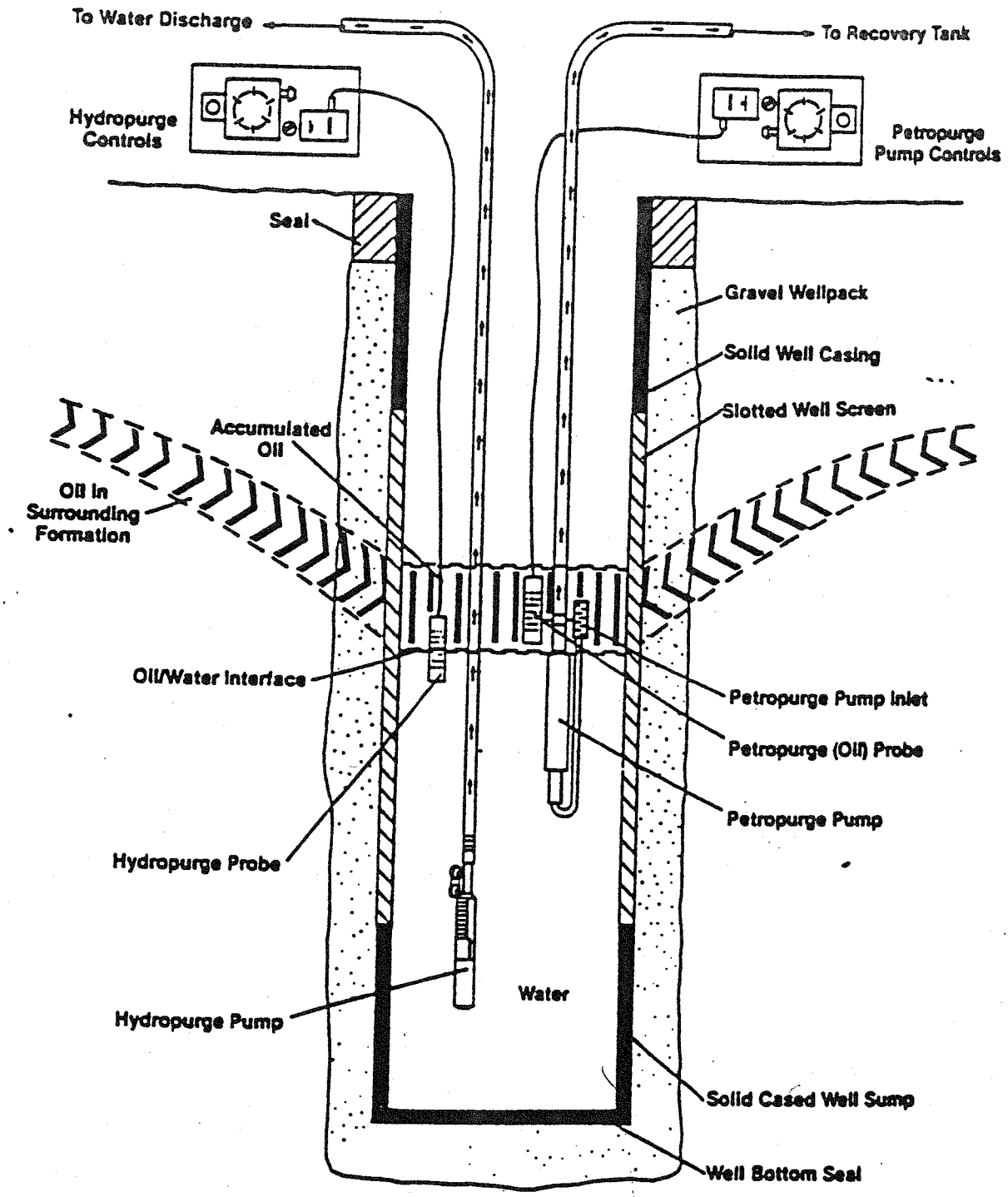


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Figure 1. Hydropurge Groundwater Drawdown Unit

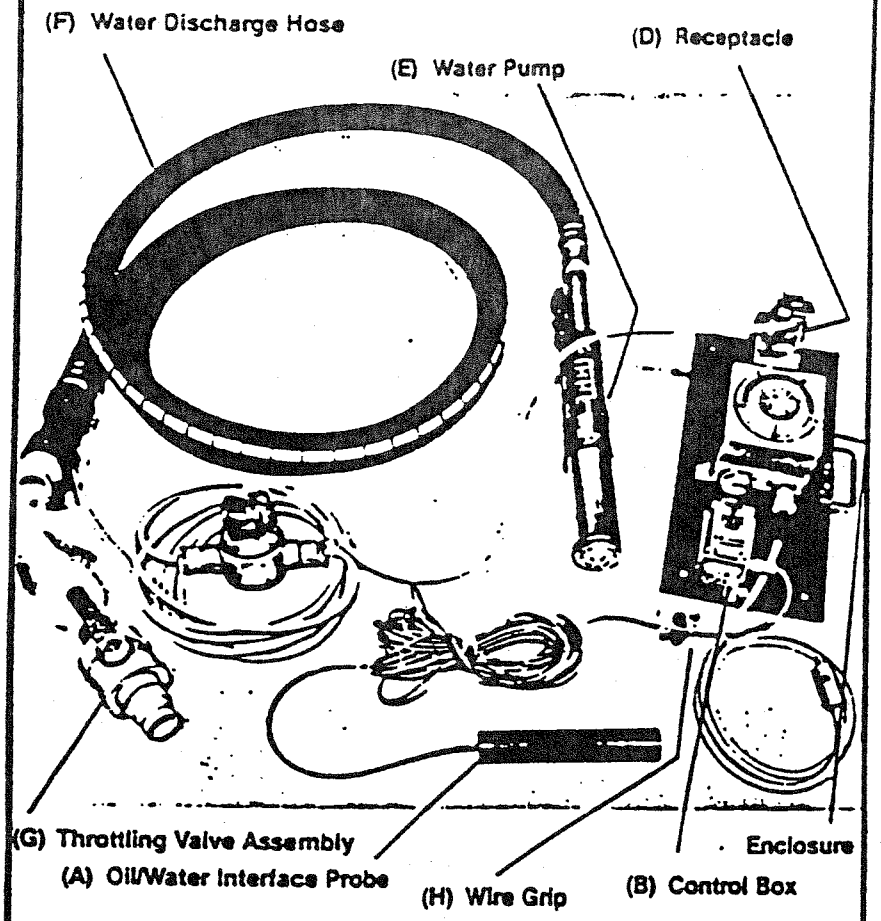
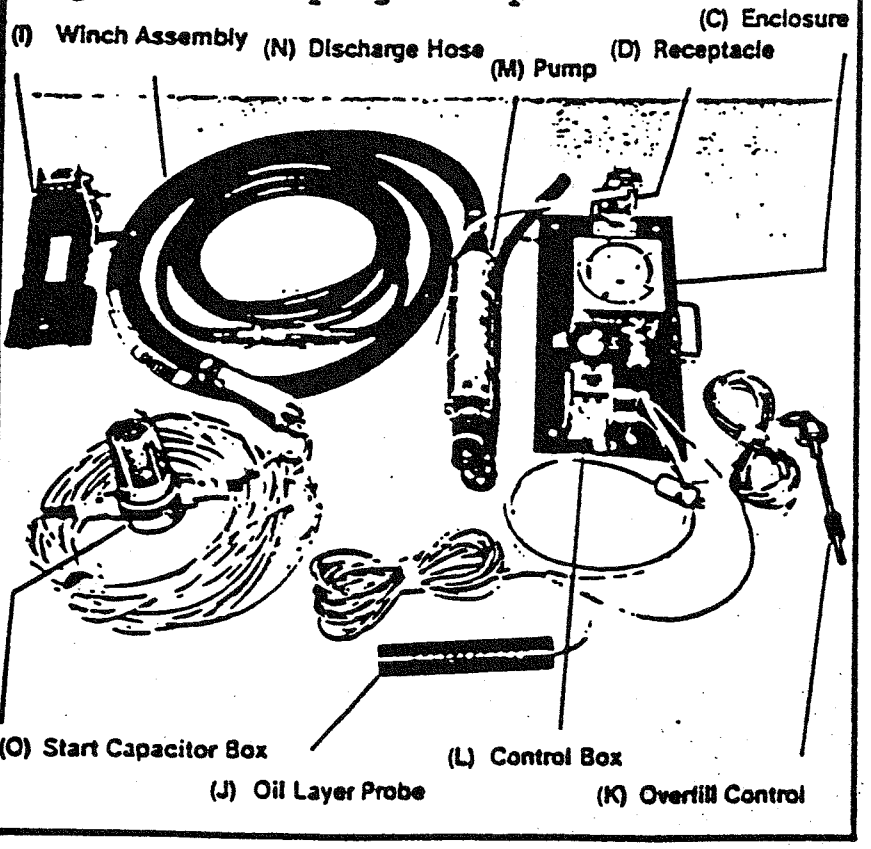


Figure 2. Petropurge Pump



PETROPURGE SYSTEM

THE HYDROPURGE GROUNDWATER DRAWDOWN UNIT

Description: (Refer to Figures 1 and 2) The function of the Hydropurge Groundwater Drawdown Unit is to dewater the recovery well. This creates a "cone of depression" centered at the recovery well, causing the liquid hydrocarbon contaminants within the radius of influence of the cone to flow toward the recovery well. (See Figure 1)

The Hydropurge Groundwater Drawdown Unit consists of the following principle parts. (See Figure 1)

- (A) Oil/Water Interface Probe. This probe senses the oil/water and controls the Hydropurge stainless steel pump.
- (B) Hydropurge Control Box (one LED)
- (C) Explosion proof enclosure. This box contains the printed circuit control board, circuit breaker, and power supply.
- (D) Explosion proof receptacle
- (E) Stainless steel submersible pump and motor
- (F) Water discharge Hose
- (G) Throttling valve assembly
- (H) Wire Grip
- (I) Winch Assembly

Deployment: The Oil/Water Interface Probe (A) contains a 7 pin electronic connector at the end of its graduated cord (one mark every foot). Plug this connector into the side of the Hydropurge Control Box (B). Plug the explosion-proof plug that comes from explosion-proof enclosure (C) into the 230 volt, single phase, 60 hertz, power source. Next plug the explosion-proof plug from the Hydropurge Pump (E) into the explosion-proof receptacle (D). Now by turning the switch on the Hydropurge Control Box (B) to "Hand" for an instant the Hydropurge (E) Pump should turn over. Do not run the pump for more than an instant dry; if possible test the pump in a barrel of water or in the recovery well itself. Notice the green LED on the Hydropurge Control Box will light when the pump is running.

A Winch Assembly (I-Figure 2) that latches onto the side of the well casing comes with each Hydropurge Groundwater Drawdown Unit. The winch is used to raise and lower the Hydropurge Pump in the well. Also a Wire Grip (H) is provided to be used to lock the graduated probe cord at any desired elevation.

The Hydropurge Pump (E) can now be lowered to a point usually 2 to 4 feet from the bottom of the recovery well using the Winch Assembly (I, Figure 2.The Hydropurge Oil/Water Interface Probe (A) can then be lowered into the well. When the probe is in water, the Hydropurge Pump (E) will turn on and begin to dewater the well, lowering the water elevation. By adjusting the elevation of this probe (A) in the well, the depth of the "cone of depression" can be set at any desired level.

Note: It is important that the Hydropurge Pump is properly sized with regard to flow capacity and total discharge head in order to function properly in the well. To check flow from a Hydropurge, pump water into a 55 gallon drum and take the time it takes to fill the drum.

The Hydropurge Throttling Valve (G) is used to smooth out the cycling of the Hydropurge Pump. Rapid on-off cycling of the pump can cause excessive wear and unnecessary maintenance. Gradually throttle down on this valve until the pump cycles less than once every four or five minutes at the desired water elevation.

Once the "cone of depression" has been established, a layer of oil should start to build up in the recovery well.

Figure 3. Petropurge Control Panel, Pump, and Pump Assembly

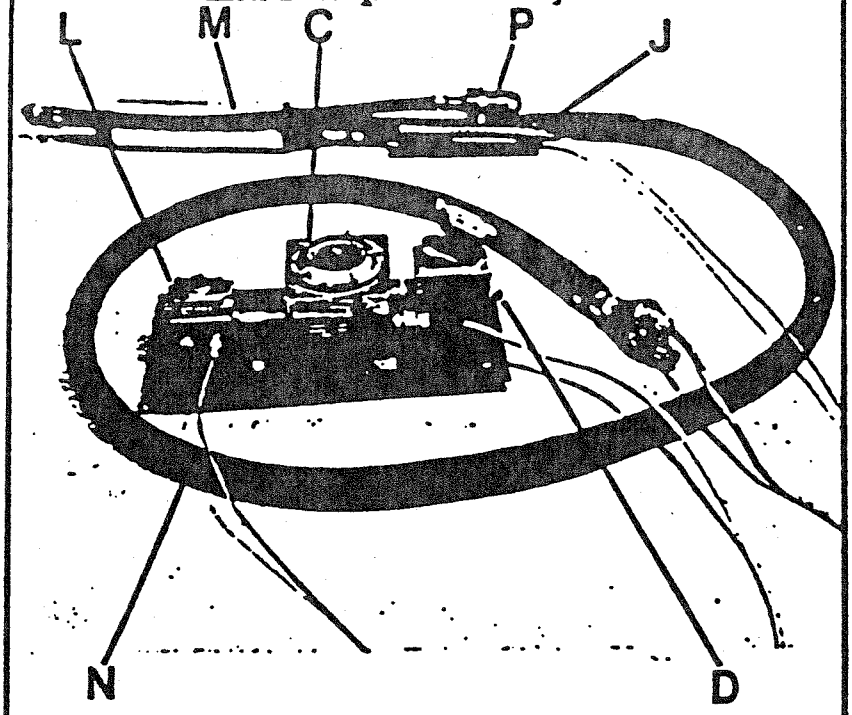


Figure 4. Petropurge Pump and Suction Assembly

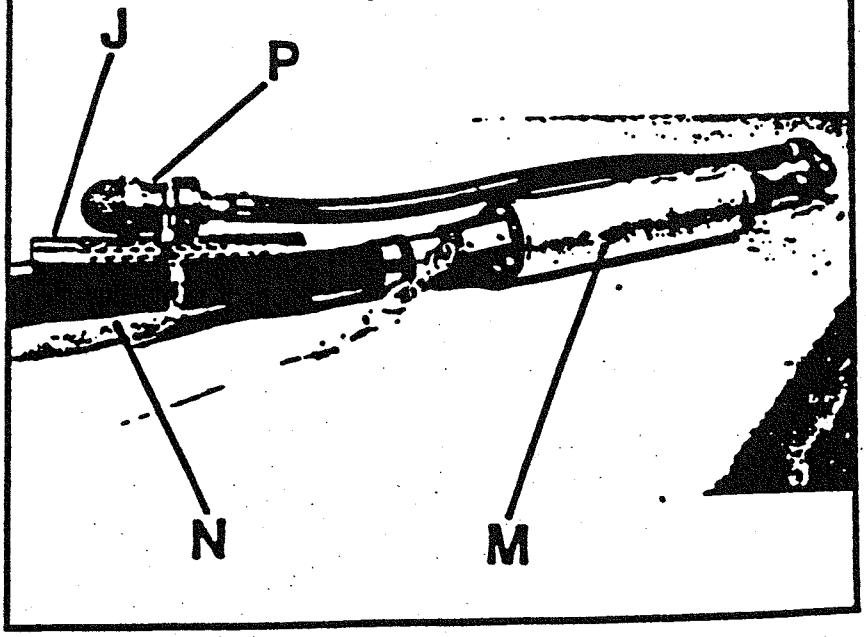


Figure 5. Petropurge Control Box and Enclosure Box

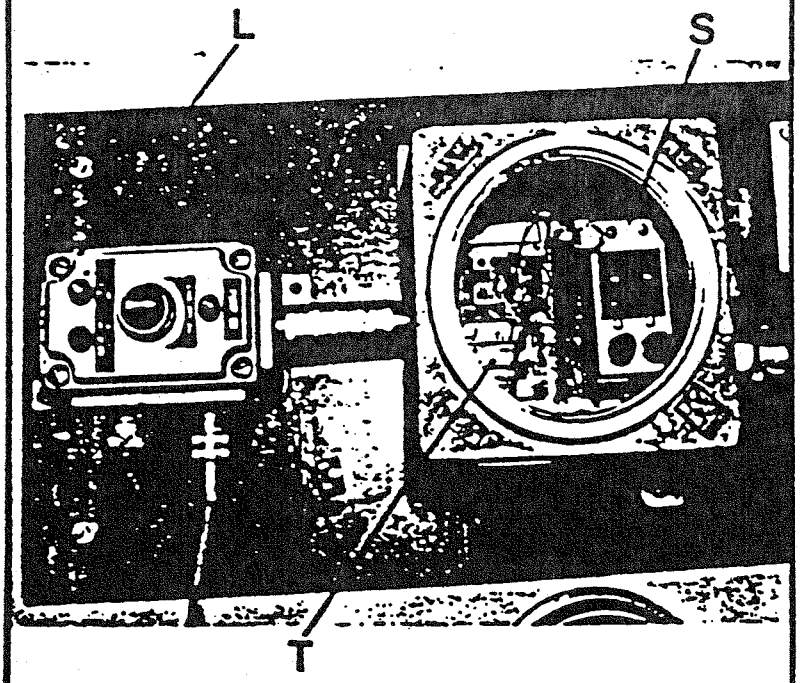
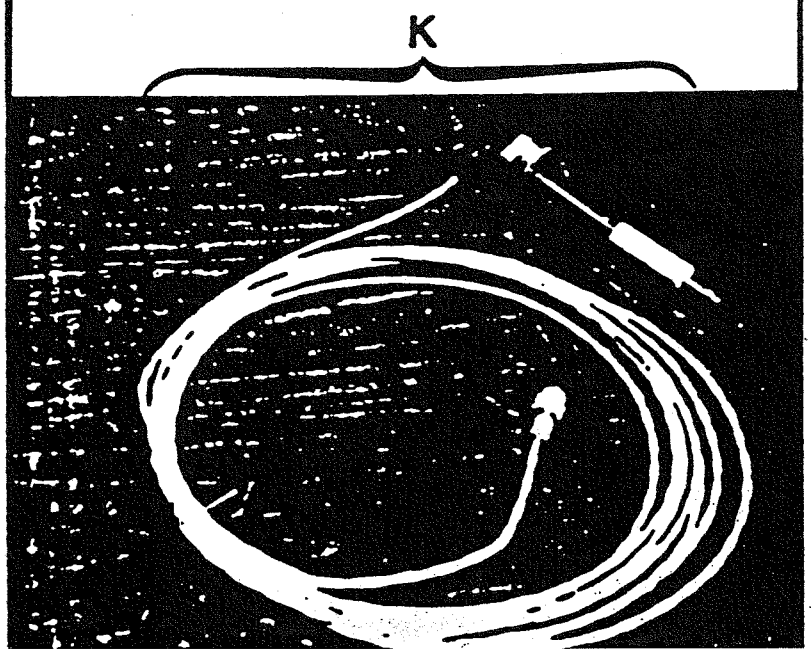


Figure 6. Recovery Tank Overfill Control



THE PETROPURGE PUMP

Description: (Refer to Cover Diagram, Figures 2 through 9).

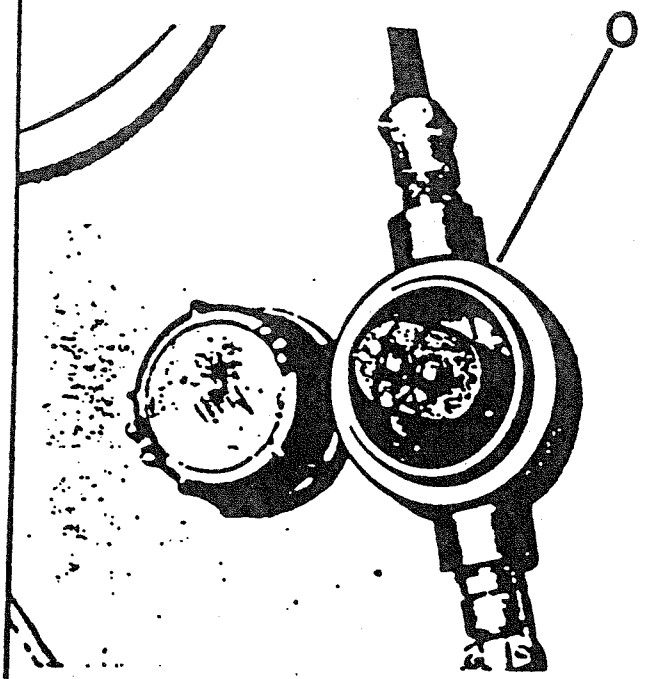
The function of the Petropurge Pump is to separate the liquid petroleum contaminants from the groundwater in the recovery well and pump this oil to a recovery tank. The Petropurge Pump consists of the following principle parts:

(C) Explosion proof Enclosure
(D) Explosion proof Receptacle
(H) Wire Grips
(I) Winch Assembly
(J) Petropurge (oil layer) Probe
(K) Recovery Tank Overfill Control
(L) Petropurge Control Box (3 LED's)
(M) Petropurge Pump
(N) Petropurge Discharge Hose
(O) Start Capacitor Box
(P) Petropurge Inlet Check Valve
(Q) Enclosure Assembly
(R) Printed Circuit Control Module
(S) Circuit Breaker
(T) Power Supply

Deployment: The Petropurge (Oil Layer) Probe (J) is connected by the 7 pin connector at the end of the probe cord to the matching connector receptacle on the side of the Petropurge Control Box (L). Next plug the power cord coming from the Enclosure (C) into your power source. Then plug the power cord from the Start Capacitor Box (O, Figure 7) into Explosion proof Receptacle (D). To test the probe turn it upside down, with the switch on Control Box (L) in the AUTO position. The green LED labelled PUMP ON, on Control Box (L), should begin to flash. This is a test of your probe circuitry.

The green LED will flash for 30 to 40 seconds and then the Petropurge Pump Motor (M) will turn on (steady green light). Only allow the Pump to run dry for an instant. This will test the pump control circuits. There is a 30 to 40 second delay built into every Petropurge Pump (M) so that it will not turn on again for a preset time interval after it has been turned off by the probe when in the AUTO position. The HAND position will override your au-

Figure 7. Petropurge Start Capacitor Box



Attach wire rope to the Petropurge Pump using hook and bracket as shown In Figure 4 The Winch Assembly (I) is attached to the well casing or other convenient supporting structure at the well.

Refer to Figures 3 and 4 Attach the red Petropurge Oil Layer Probe (J) to the Petropurge Discharge Hose (N, using a worm gear clamp provided with the probe (see Figure 3). Use the second worm gear clamp to attach the Inlet Check Valve (P) to the hose and probe as shown. Adjust the Inlet Check Valve (P) so that the bottom openings in its screen are lined up with the horizontal line scratched into the red paint on the Petropurge Oil Layer Probe (J). This will set your sensors for proper operation.

If you want to have overfill protection for your recovery tank, insert Recovery Tank Overfill Control Float (K, Figure 6) into the top of your recovery tank and connect the 3-Pin Connector at the end of its cord into the appropriate socket in the side of Control Box (L).

By turning the switch on Control Box (L) to the HAND position, you will by-pass your control circuitry and the Petropurge Pump (M) will turn on immediately. Again, do not run your pump dry for more than an instant.

Now you can lower the Petropurge Pump (M), Petropurge Inlet Check Valve (P), and Petropurge Probe (J) down the recovery well using Winch Assembly (I). Lower the Petropurge Pump (M) until either the green LED starts to flash or the red LED on Petropurge Control Box (L) comes on. The red light means water is approaching the inlet screen of the Inlet Valve (P) and there is less than 4 inches of oil in the well.

Figure 8. Enclosure Assembly

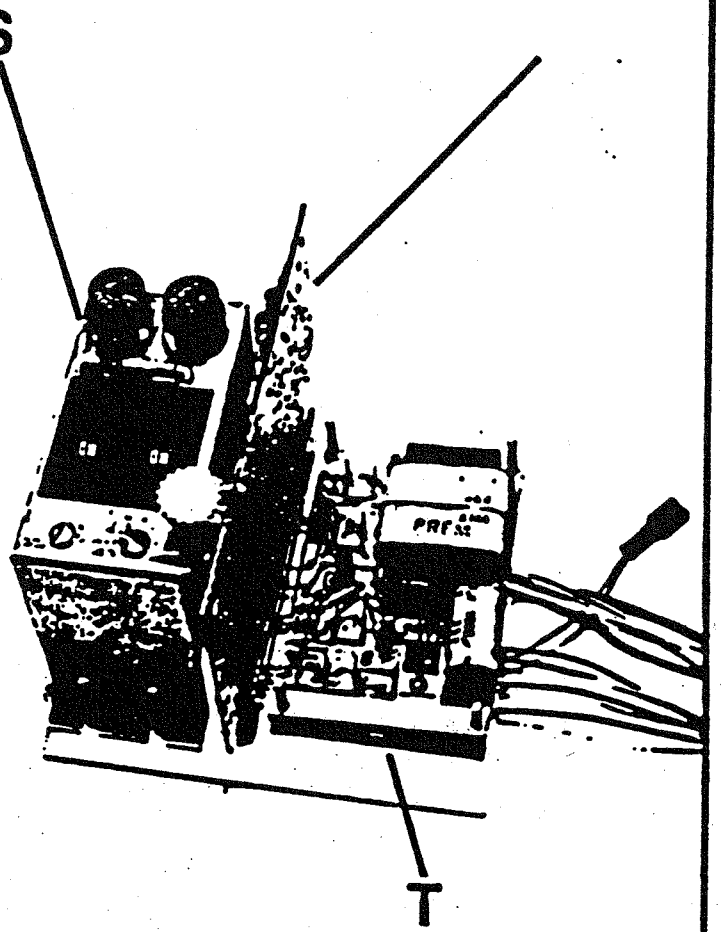
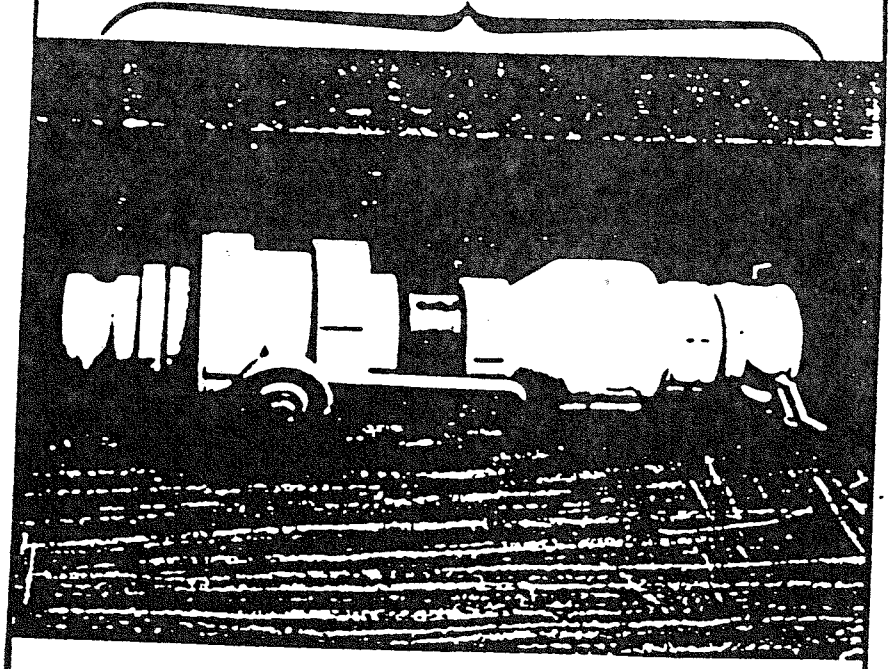


Figure 9. Hydropurge Throttling Valve Assembly



(Refer to Cover Diagram)

The Petropurge Probe (J) should b set so that the bottom of its tubular cas is somewhere between the top and bo tom of the cage of Hydropurge Oil/Wate Interface Probe (A). By raising the Petrc purge Probe (J) above the top of th Hydropurge Probe (A) the oil layer thick ness in the well will be increased so tha the Petropurge Pump (M) will not turn or until there is considerably more thar four inches of oil present.

Lowering the Petropurge Probe (J) sc that it is below the Hydropurge Probe (A will submerge the sensors that detec water approaching the Petropurge In- let Valve (P) in water. This will cause the red LED to come on and prevent the Petropurge Pump from turning on even though more than 4 inches of oil are present. The oil layer would have to then build up to such a thickness the hydro- static pressure developed by the weight of the oil was enough to depress the oil/ water interface below the Hydropurge Probe (A) and immerse the Petropurge Probe (J) in oil.

Note: The Petropurge Probe (J) cable is graduated with marks at every one foot interval, as is the Hydropurge Probe (A) cable.

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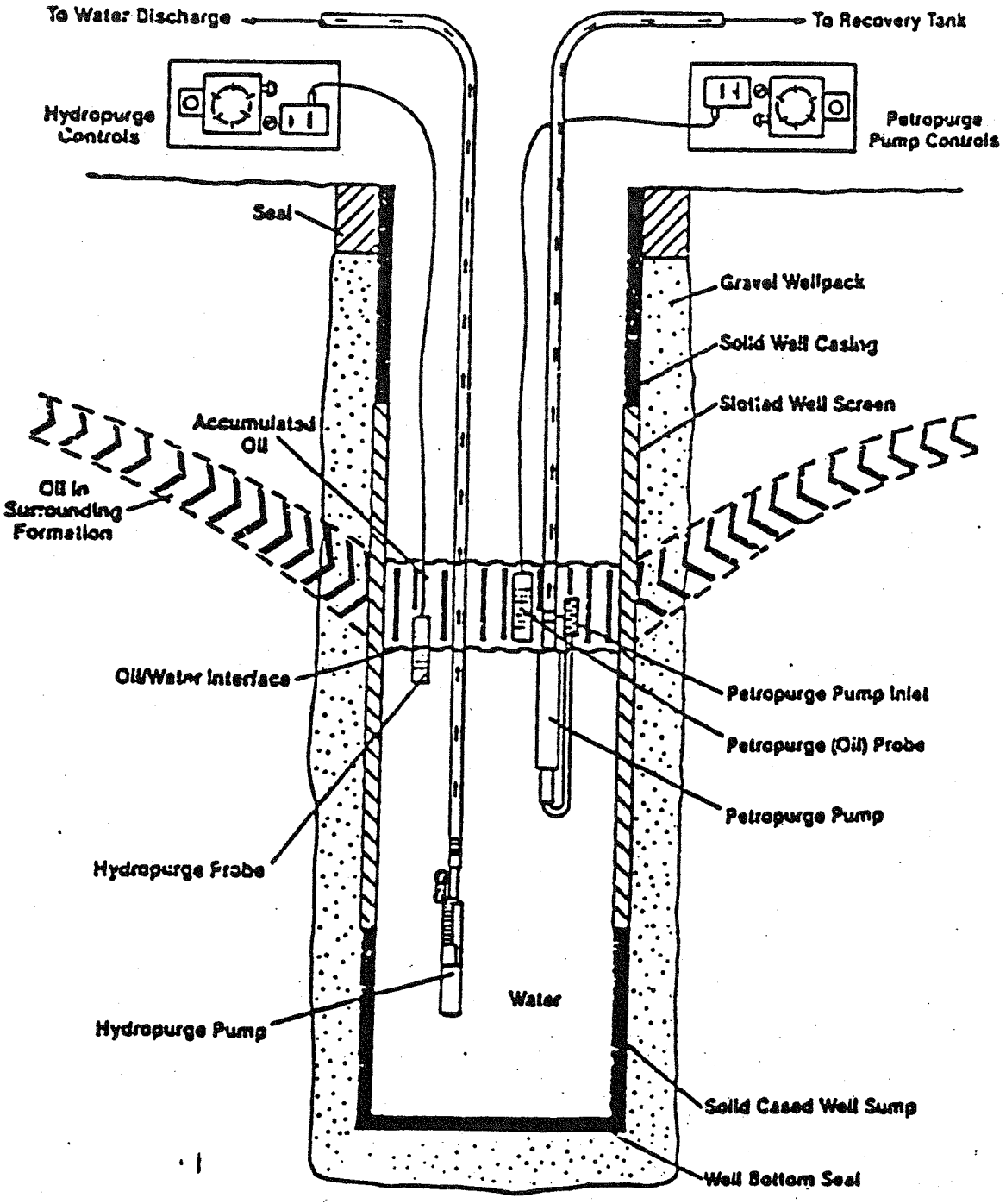
INSTALLATION

AND

OPERATING INSTRUCTIONS



1. Shipment Inspection

Examine the components carefully to make sure no damage has occurred to the pump-end, motor, cable or control box during shipment.

This Grundfos Submersible Pump should remain in its shipping carton until it is ready to be installed. The carton is specially designed to protect it from damage. During unpacking and prior to installation, care should be taken that the pump is not dropped or mishandled; if a submersible pump is damaged or bent, misalignment can occur.

The motor is equipped with an electrical cable. Under no circumstances should the cable be used to support the weight of the pump.

You will find a loose data plate wired to the pump. It should be securely mounted at the well or attached to the control box.

2. Pre-Installation Checklist

Before beginning installation procedures, the following checks should be made. They are all critical for the proper installation of this submersible pump.

1. Condition of the Well

If the pump is to be installed in a new well, the well should be fully developed and bailed or blown free of cuttings and sand. The stainless steel construction of the Grundfos submersible makes it resistant to abrasion; however, no pump, made of any material, can forever withstand the destructive wear that occurs when constantly pumping sandy water.

If this pump is used to replace an oil-filled submersible or oil-lubricated line-shaft turbine in an existing well, the well must be blown or bailed clear of oil.

Determine the maximum depth of the well, and the drawdown level at the pump's maximum capacity. Pump selection and setting depth should be made based on this data.

The inside diameter of the well casing should be checked to ensure that it is not smaller than the size of the pump and motor.

2. Condition of the Water

Submersible well pumps are designed for pumping clear, cold water, free of air or gases. Decreased pump performance and life expectancy can occur if the water is not clear, cold or contains air or gases.

Maximum water temperature should not exceed 102°F. Special consideration must be given to the pump and motor if it is to be used to pump water above 102°F.

The Grundfos stainless steel submersible is highly resistant to the normal corrosive environment found in some water wells.

If water well tests determine an excessive or unusual corrosive quality, or exceeds 102°F, contact your Grundfos representative for information concerning specially designed pumps for these applications.

3. Installation Depth

A check should be made to ensure that the installation depth of the pump will always be at least three feet below the maximum drawndown level of the well. For flow rates exceeding 100 gpm, the NPSH may have to be considered. Refer to NPSH curves in technical catalog.

The bottom of the motor should never be installed lower than the top of the well screen or within five feet of the well bottom.

If the pump is to be installed in a lake, pond, stream, tank or larger diameter well, the water velocity passing over the motor must be sufficient to ensure proper motor cooling. The minimum water flow rates which insure proper cooling for the various motor sizes are listed in Table A.

4. Electrical Supply

The motor voltage, phase and frequency indicated on the motor nameplate should be checked against the actual available electrical supply.

3. Wire Cable Type and Size

The type of wire used between the pump and control boxes should be approved for submersible pump application. The conductor can be solid or stranded. The cable may be individual insulated conductors twisted, insulated

conductors molded side by side in one flat cable or insulated conductors with a round overall jacket. The insulation conductor should be type RW, RUW, TW or equivalent and must be suitable for use with submersible pumps. See Table D for recommended sizes of cable for various cable lengths.

Splicing the Motor Cable 4.

The cable splice is a very important part of the installation of the submersible pump and must be done with extreme care.

If the splice is carefully made, it will be as efficient as any other portion of the cable, and will be completely watertight.

There are a number of cable splicing kits available today — epoxy-filled, rubber sealed and so on. Many perform well if the manufacturer's directions are followed carefully. If one of these kits is not used, we recommend the following method for splicing the motor cable to the drop cable:

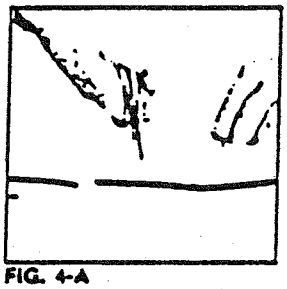


FIG. 4-A

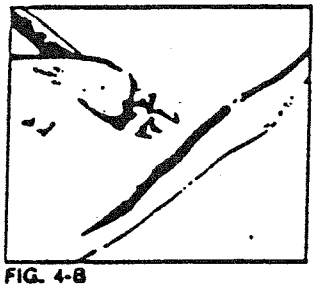


FIG. 4-B

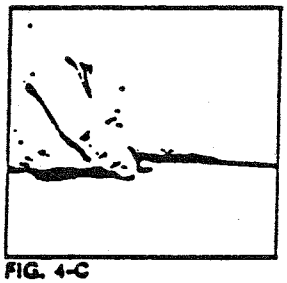


FIG. 4-C

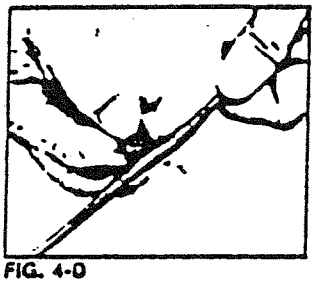


FIG. 4-D

1. Examine the motor cable and the drop cable carefully for damage.

2. Cut the motor leads off in a staggered manner. Cut the ends of the drop cable so that the ends match up with the motor leads. (See Figure 4-A) On single-phase motors, be sure to match the colors.

3. Strip back and trim off ½ inch of insulation from each lead, making sure to scrape the wire bare to obtain a good connection. Be careful not to damage the copper conductor when stripping off the insulation.

4. Insert a properly sized "Sta-Kon" type connector on each pair of leads, again making sure that colors are matched. Using a "Sta-Kon" crimping pliers, indent the lugs. (See Figure 4-B) Be sure to squeeze down hard on the pliers, particularly when using large cable.

5. Form a piece of electrical insulation putty tightly around each "Sta-Kon." The putty should overlap on the insulation of the wire. (See Figure 4-C)

6. Use a good quality tape, such as "#33 Scotch Waterproof" or "Plymouth Rubber Company Slipknot Grey." Wrap each wire and joint tightly for a distance of about 2½ inches on each side of the joint. Make a minimum of four passes over each joint and overlap each pass approximately one inch to assure a completely watertight seal. (See Figure 4-D)

Installation 5.

The riser pipe should be properly sized and selected based on estimated flow-rates and friction-loss factors. Attaching pump to riser pipe:

A back-up wrench should be used when the riser pipe is attached to the pump. The pump should only be gripped by the four flats on the top of the discharge chamber. Under no circumstances, grip the body of the pump, cable guard or motor.

The threaded end of the first section of the riser pipe or the nipple must not come in contact with the check valve retainer in the discharge chamber of the pump when tightened down.

After the first section of the riser pipe has been attached to the pump, the lifting cable or elevator should be clamped to the pipe. Do not clamp the pump. When raising the pump and riser section, be careful not to place bending stress on the pump by picking it up by the pump-end only.

Make sure that the electrical cables are not cut or damaged in any way when the pump is being lowered in the well.

If steel riser pipe is used:

We recommend that steel riser pipes always be used with the larger submersibles. A pipe thread compound should be used on all joints. Make sure the joints are adequately tightened in order to resist the tendency of the motor to loosen the joints when stopping and starting.

The drop cable should be secured to the riser pipe at frequent intervals to prevent sagging, looping and possible cable damage. Nylon cable clips or waterproof tape may be used. The cable splice should be protected by securing it with clips or tape just above and below the splice.

Control Box

1. Single-Phase Motors:

Single-phase motors must be connected as indicated in the motor control box.

2. Three-Phase Motors

Three-phase motors must be used with the proper size and type motor starter to ensure the motor is protected against damage from low voltage, phase failure, curr unbalance and overload current. A properly sized sta with ambient compensated extra quick-trip overloads m be used to give the best possible motor winding protecti Each motor line must be protected on all three legs w overloads. The thermal overloads supplied must trip in l than 10 seconds at locked rotor (starting) current. starter and overload protection guide, see Table H.

Pumps should NEVER be started to check rotation unless the pump is totally submerged. Severe damage may be caused to the pump and motor if they are r dry.

High Voltage Surge Arresters

In addition to the motor starter with overloads, a high voltage surge arrester should be used to protect the motor against lightning and switching surges. Lightning voltage surges in power lines are caused when lightning strikes somewhere in the area. Switching surges are caused by the opening and closing of switches on the main high-voltage distribution power lines.

The correct voltage-rated arrester should be installed on the supply (line) side of the control box or starter (see Figures 6-A and 6-B). The arrester must be grounded in accordance with the National Electric Code and Local governing regulations.

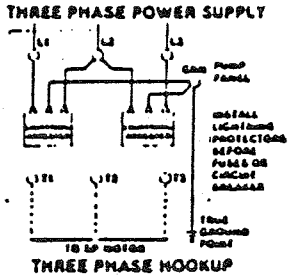


FIG. 6-A

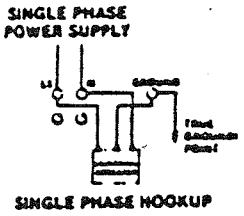


FIG. 6-B

The warranty on all three-phase submersible motors is VOID if:
1. The motor is operated with single-phase power through a phase converter.
2. Three-leg ambient compensated extra quick-trip overload protectors are not used.
3. Three-phase current balance is not checked and recorded. (See START-UP Section 7 for instructions.)
4. High voltage surge arresters are not installed.

Control Box and Surge Arrester Grounding

The control box shall be permanently grounded in accordance with the National Electric Code and local governing codes or regulations. The ground wire should be a bare copper conductor at least the same size as the drop cable wire size. Ground wire should be run as short a distance as possible and securely fastened to a true grounding point.

True grounding points are considered to be: a grounding rod driven into the water strata; steel well casing submerged into the water lower than the pump setting lev and steel discharge pipes without insulating couplings. plastic discharge pipe and well casing are used, a prope sized bare copper wire should be connected to a stud the motor and run to the control panel. Do not ground a gas supply line. Connect the grounding wire to the grou point first and then to the terminal in the control box.

Wiring Checks

Before making the final wiring connections on the drop cable to the control box terminal, it is good practice to check the insulation resistance to ensure that the cable and splice are good. Measurements for a new installation must be 1,000,000 ohm or more. Do not start the pump if the measurement is less than this. If it is above, finish wiring a verify that all electrical connections are made in accordan with the wiring diagram. Check to ensure the control b and high voltage surge arrester have been grounded.

Start-Up 7

After the pump has been set into the well and the wiring connections have been made, the following procedures should be performed.

a. *Attach a temporary horizontal length of pipe to the riser pipe.*
b. *Install a gate valve and another short length of pipe to the temporary pipe.*
c. *Adjust the gate valve one-third of the way open.*
d. *Verify that the electrical connections are in accordance with the wiring diagram.*

Three-Phase Motors

1. Check the direction of rotation.

Three-phase motors can run in either direction depending on how they are connected to the power supply. So, when the three cable leads are first connected to the power supply, there is a 50% chance that the motor will run in the proper direction. To make sure the motor is running in the proper direction, carefully follow the procedures below:

a. Start the pump and check the water quantity, and pressure developed.

b. Stop the pump and interchange any two leads.

c. Start the pump and again check the water quantity and pressure.

d. Compare the results observed. The wire connection which gave the highest pressure and largest water quantity is the correct connection.

2. Check for current unbalance.

Current unbalance causes the motor to have reduced starting torque, overload tripping, excessive vibration and poor performance which can result in early motor failure. It is very important current unbalance be checked in all three-phase systems. **Current unbalance between the legs should not exceed 5% under normal operating conditions.**

The supply power service should be verified to see if it is a two or three transformer system. The information can be obtained by counting the transformers or by contacting your power company. If two transformers are present, the system is an "open delta" or "wye". If three transformers are present, the system is true three-phase.

Make sure the transformer ratings in kilovolt amps (KVA) is sufficient for the motor load. See Table C.

The percentage of current unbalance can be calculated by using the following formulas and procedures:

$$\text{Average current} = \frac{\text{Total of current values measured on each leg}}{3}$$

$$\text{\% Current unbalance} = \frac{\text{Greatest amp difference from the average}}{\text{average current}} \times 100$$

Determine the percentage of current unbalance by:

Step 1. Measure and record current readings in amps for each leg (hookup). Disconnect power.

Step 2. Shift or roll the motor leads from left to right so the drop cable lead that was on terminal 1 is now on 2, lead on 2 is now on 3, and lead on 3 is now on 1 (hookup 2). Rolling the motor leads in this manner will not reverse the motor rotation. Start the pump, measure and record current reading on each leg. Disconnect power.

Step 3. Again shift drop cable leads from left to right so the lead on terminal 1 now goes to 2, 2 to 3, and 3 to 1 (hookup 3). Start pump, measure and record current reading on each leg. Disconnect power.

Step 4. Add together the values for each hookup.

Step 5. Divide the total by 3 to obtain the average.

Step 6. Compare each single leg reading from the average to obtain the greatest amp difference from the average.

Step 7. Divide this difference by the average to obtain the percentage of unbalance.

Use the wiring hookup which provides the lowest percentage of unbalance. (See Table "F" for a specific example of correcting for three-phase power unbalance).

Developing the Well

After proper rotation and current unbalance have been checked, start the pump and let it operate until the water runs clear of sand, silt and other impurities.

Slowly open the valve in small increments as the water clears until the valve is all the way open. **The pump should not be stopped until the water runs clear.**

If the water is clean and clear when the pump is first started, the valve should still be slowly opened until it is all the way open. As the valve is being opened, the draw down should be checked to ensure the pump is always submerged. **The dynamic water level should always be more than 3 feet above the inlet strainer of the pump.**

Disconnect the temporary piping arrangements and complete the final piping connections. Start the pump and test the system. Check and record the voltage and current draw on each motor lead.

Operating and Maintenance

The pump and system should be periodically checked for water quantity, pressure, draw down, periods of cycling, and operation of controls.

Under no circumstances should the pump be operated for any prolonged periods of time with the discharge valve closed. This can result in motor and pump damage due to overheating. A properly sized relief should be installed at the well head to prevent the pump from running against a closed valve.

If the pump fails to operate, or there is a loss of performance, refer to the Trouble Shooting Section 8.

Trouble-Shooting 8

The majority of problems that develop with submersible pumps are electrical, and most of these problems can be serviced without pulling the pump from the well. The following charts cover most of the submersible service work. As with any trouble-shooting procedure, start with the simplest solution first; always make all the above ground checks before considering pulling the pump from the well.

Basically, only two instruments are needed — a combination voltmeter/ampmeter, and an ohmmeter. These are relatively inexpensive and can be obtained from most water systems suppliers.

WHEN WORKING WITH ELECTRICAL CIRCUITS, USE CAUTION TO AVOID ELECTRICAL SHOCK. It's recommended that rubber gloves and boots be worn and that care be taken to have metal control boxes and motors grounded to power supply ground or steel drop pipe or casing extending into the well. WARNING: Submersible motors are intended for operation in a well. When not operated in a well, failure to connect motor frame to power supply in neutral ground may result in serious electrical shock.

Preliminary Tests

Supply Voltage

How to Measure

By means of a volt meter, which has been set to the proper scale, measure the voltage at the control box or starter.

On single-phase units measure between line and neutral.

On three-phase units measure between the legs (phases).

What It Means

When the motor is under load, the voltage should be within ± 10% of the nameplate voltage. Larger voltage variation may cause winding damage.

Large variations in the voltage indicate a poor electrical supply and the pump should not be operated until these variations have been corrected.

If the voltage constantly remains high or low the motor should be changed to the correct supply voltage.

Current Measurement

How to Measure

By use of an ampmeter, set on the proper scale, measure the current on each power lead at the control box or starter. See the Electrical Data, Table E for motor amp draw information.

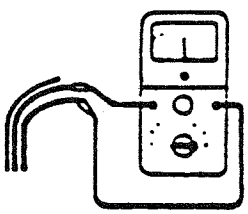
Current should be measured when the pump is operating at constant discharge pressure when the motor is fully loaded.

What It Means

If the amp draw exceeds the listed service factor amps (SFA) or if the current unbalance is greater than 5% between each leg on three-phase units, check the following:

1. Burnt contacts on motor starter.
2. Loose terminals in starter or control box or possible cable defect. Check winding and insulation resistances.
3. Too high or low supply voltage.
4. Motor windings are shorted.
5. Pump is damaged causing a motor overload.

Winding Resistance



How to Measure

Turn off power and disconnect the drop cable leads in the control box or starter. Using an ohm meter, set the scale selectors to Rx1 for values under 10 ohms and Rx10 for values over 10 ohms.

Zero adjust the meter and measure the resistance between leads. Record the values.

Motor resistance values can be found in the Electrical Data, Table E. Cable resistance values in Table G.

What It Means

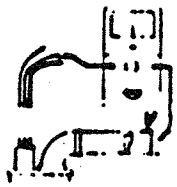
If all the ohm values are normal, and the cable colors correct, the windings are not damaged.

If any one ohm value is less than normal the motor may be shorted.

If any one ohm value is greater than normal, there is a poor cable connection or joint. The windings or cable may also be open.

If some of the ohm values are greater than normal and some less, the drop cable leads are mixed. To verify lead colors, see resistance values in Electrical Data, Table E.

Insulation Resistance



How to Measure

Turn off power and disconnect the drop cable leads in the control box or starter. Using an ohm or mega ohm meter set the scale selector to Rx100K and zero adjust the meter.

Measure the resistance between the lead and ground. (Discharge pipe or well casing if steel.)

What It Means

For ohm values, refer to table on following page. Motors of all Hp, voltage, phase and cycles duties have the same value of insulation resistance.

* CONDITION OF MOTOR AND LEADS	OHM VALUE	MEGOHM VALUE
New Motor.	2,000,000 (or more)	2.0
Used motor which can be reinstalled in the well.	1,000,000 (or more)	1.0
MOTOR IN WELL. Ohm readings are for drop cable plus motor.		
A motor in the well in reasonable good condition.	500,000 - 1,000,000	0.5 - 1.0
A motor which may have been damaged by lightning or with damaged leads. Do not pull the pump for this reason.	20,000 - 500,000	0.02 - 0.5
A motor which definitely has been damaged or with damaged cable. The pump should be pulled and repairs made to the cable or the motor replaced. The motor will not fail for this reason alone, but it will probably not operate for long.	10,000 - 20,000	0.01 - 0.02
A motor which has failed or with completely destroyed cable insulation. The pump must be pulled and the cable repaired or the motor replaced. The motor will not run in this condition.	less than 10,000	0 - 0.01

Trouble Shooting Chart

Fault	Possible Causes	How to Check	How to Correct
A. Pump Does Not Run.	1. No electricity at pump panel.	Check for voltage at pump panel.	If no voltage at pump panel, check house or feeder panel for tripped circuits.
	2. Fuses are blown or circuit breakers are tripped.	Remove fuses and check for continuity with ohmmeter.	Replace blown fuses or reset circuit breaker. If new fuses blow or circuit breaker trips, the electrical installation, motor and cable must be checked.
	3. Motor starter overloads are burnt or have tripped out.	Check for voltage on line and load side of starter.	Replace burnt heaters or reset. Inspect starter for other damage. If heater trips again, check the supply voltage and starter holding coil.
	4. Starter does not energize.	Energize control circuit and check for voltage at the holding coil.	If no voltage, check control circuit. If voltage, check holding coil for shorts. Replace bad coil.
	5. Defective controls.	Check all safety and pressure switches for operation. Inspect contact in control devices.	Replace worn or defective parts.
	6. Motor and/or cable are defective.	Turn off voltage, disconnect drop leads from control box to the motor. Measure the lead to lead resistances with ohmmeter (RX-1). Measure lead to ground values with ohmmeter (RX-100K). Record measured values.	If open winding or ground is found, remove pump and recheck values at the surface. Repair or replace motor or cable.
	7. Defective capacitor.	Turn off voltage, discharge capacitor. Check with ohmmeter (RX-100K).	Replace if defective.
B. Pump Runs But Does Not Deliver Water.	1. Water level in well is too low or well is collapsed.	Check well draw down.	Water level should be at least 3 feet above pump inlet during operation.
	2. Integral pump check valve is blocked.	Install pressure gauge, start pump, gradually close the discharge valve and read pressure at shut-off.	Remove pump and inspect discharge section. Remove blockage, repair valve and valve seat if necessary. Check for other damage. Rinse out pump and reinstall.
	3. Inlet strainer is clogged.	Same as number two above.	Remove pump and inspect. Clean strainer, check integral, check valve for blockage, rinse out pump and reinstall.

Fault	Possible Causes	How to Check	How to Correct
	4. Pump is defective.	Same as number two above.	Convert PSI to feet (PSI x 2.31 PSI = ___ ft), add elevation fr top of well to water level to the pressure reading. Refer to the specific pump curve for shut-o head for that pump model. If head is close to curve, pump is probably OK. If not, remove pu and inspect.
C. Pump Runs But at Reduced Capacity.	1. Wrong rotation.	Check for proper electrical connection in control box.	Correct wiring and change lea as required.
	2. Draw down is larger than anticipated.	Check draw down during pump operation.	Lower pump if possible. If not, throttle discharge valve and in- stall water level control.
	3. Discharge piping or valve leaking.	Examine system for leaks.	Repair leaks.
	4. Pump strainer or check valve are clogged.	Remove pump and inspect.	Clean, repair, rinse out pump and reinstall.
	5. Pump worn.	Install pressure gauge, start pump, gradually close the dis- charge valve and read pressure at shut-off.	Convert PSI to feet (PSI x 2.31 PSI = ___ft), add elevation fr top of well to water level to th pressure reading. Refer to the specific pump curve for shut-o head for that pump model. If head is close to curve, pump i probably OK. If not, remove pu and inspect.
D. Pump Cycles Too Much.	1. Pressure switch is not properly adjusted or is defective.	Check pressure setting on switch and operation. Check voltage across closed con- tacts.	Readjust switch or replace if defective.
	2. Level control is not properly set or is defective.	Check setting and operation.	Readjust setting (refer to manufacturer data). Replace if defective.
	3. Insufficient air charging or leaking tank or piping.	Pump air into tank or diaphram chamber.	Check diaphram for leak. Chec tank and piping for leaks with soap and water solution. Chec air to water volume.
	4. Plugged snifter valve or bleed orifice.	Examine valve and orifice for dirt or corrosion.	Clean and/or replace if defect
	5. Tank is too small.	Check tank size.	Tank volume should be appro- imately 10 gallons for each gp of pump capacity.
E. Fuses Blow Or Circuit Breakers Trip.	1. High or low voltage.	Check voltage at pump panel.	If not within ± 10%, check wi size and length of run to pump panel.
	2. Three phase current un- balance.	Check current draw on each lead.	Must be within ± 5%. If not contact power company.
	3. Control box wiring and components.	Check control box parts, match parts list. Check wiring matches wiring diagram. Check for loose or broken wires or terminals.	Correct as required.
	4. Capacitor.	Discharge capacitor. Check using an ohmmeter (RX-100K).	When meter is made, the ohm meter needle should jump for ward and slowly drift back. If meter movement, replace the capacitor.
	5. Starting relay (Franklin single phase motors only).	Check resistance of relay coil with an ohmmeter (RX-1000). Check contacts for wear.	Replace defective relay.

TABLE A

Minimum Water Flow Requirements for Submersible Pump Motors

Motor Diameter	Casing or Sleeve I.D. In Inches	Min. GPM Flow Pass the Motor
4"	4	1.2
	5	7
	6	13
	7	21
	8	30
6"	6	10
	7	28
	8	45
	10	85
	12	140
	14	198
	16	275
8"	8	10
	10	55
	12	110
	14	180
	16	255

a. A flow inducer or sleeve must be used if the water enters the well above the motor or if there is insufficient water flow past the motor.

b. The minimum water velocity over 4" motors is 0.25 feet per second.

c. The minimum water velocity over 6" and 8" motors is 0.5 feet per second.

TABLE B

Engine Driven Generators for Submersible Pumps

Motor HP for Single or Three Phase Units	Minimum Kilowatt Rating of Generator for Three-Wire Submersible Pump Motors: Externally Regulated	Internally Regulated
0.33	1.5	1.2
0.50	2.0	1.5
0.75	3.0	2.0
1.0	4.0	2.5
1.5	5.0	3.0
2.0	7.5	4.0
3.0	10.0	5.0
5.0	15.0	7.5
7.5	20.0	10.0
10.0	30.0	15.0
15.0	40.0	20.0
20.0	60.0	25.0
25.0	75.0	30.0
30.0	100.0	40.0
40.0	100.0	50.0
50.0	150.0	60.0
60.0	175.0	75.0
75.0	250.0	100.0
100.0	300.0	150.0

Notes:

1. Table is based on typical 80°C. rise continuous duty generators with 25% maximum voltage dip during starting single and three phase motors.
2. Contact the manufacturer of the generator whenever possible to assure his unit has adequate capacity to run the submersible motor.
3. If the generator rating is in KVA instead of kilowatts, multiply the above ratings by 1.25 to obtain KVA.

TABLE C

Transformer Capacity Required for Three-Phase Submersible Pump Motors

Three-Phase Motor HP	Minimum Total KVA Required*	Minimum KVA Rating for Each Transformer: 2 Transformers Open Delta or Wye	3 Transformers Delta or Wye
1½	3	2	1
2	4	2	1½
3	5	3	2
5	7½	5	3
7½	10	7½	5
10	15	10	5
15	20	15	7½
20	25	15	10
25	30	20	10
30	40	25	15
40	50	30	20
50	60	35	20
60	75	40	25
75	90	50	30
100	120	65	40

*Pump motor KVA requirements only, and does not include allowances for other loads.

TABLE D

Submersible Pump Cable Selection Chart 60 Hz

The following tables list the recommended copper cable sizes and various cable lengths for submersible pump motors.

These tables comply with the 1978 edition of the National Electric Code Table 310-16, Column 2 for 75°C wire. The ampacity (current carrying properties of a conductor) have been divided by 1.25 per the N.E.C., Article 430-22, for motor branch circuits based on motor amps at rated horsepower.

To assure adequate starting torque, the maximum cable lengths are calculated to maintain 95% of the service entrance voltage at the motor when the motor is running at maximum nameplate amps. Cable sizes larger than specified may always be used and will reduce power usage.

The use of cables smaller than the recommended sizes will void the warranty. Smaller cable sizes will cause reduced starting torque and poor motor operation.

TABLE D Submersible Pump Cable Selection Chart 60 H

continu

SINGLE-PHASE MOTOR MAXIMUM CABLE LENGTH (Motor to Service Entrance) (2)

Motor Rating		Copper Wire Size (1)								
Volts	HP	14	12	10	8	6	4	2	0	00
115	½	134	212	333	522	810	1240	1890	2550	
	½	100	159	249	390	608	930	1410	1910	
230	½	533	850	1350	2110	3290	5025	7650		
	¾	404	641	1003	1575	2450	3750	5710		
	1	293	473	740	1161	1810	2760	4210	5680	
	1	248	392	617	968	1507	2300	3510	4730	5920
	1½	205	326	510	801	1248	1920	2930	3950	4940
	2	180	286	449	703	1096	1675	2550	3440	4300
	3		229	359	563	877	1339	2041	2750	3440
	5			216	315	490	750	1442	1540	1925
	7½				270	362	553	842	1136	1420
	10					250	425	650	875	1100

CAUTION: Use of wire size smaller th
listed will void warranty.

FOOTNOTES:

(1) If aluminum conductor is used, multi
lengths by 0.5. Maximum allowable len
of aluminum is considerably shorter th
copper wire of same size.

(2) The portion of the total cable which is
tween the service entrance and a 3 ø mo
starter should not exceed 25% of the to
maximum length to assure reliable star
operation. Single phase control boxes m
be connected at any point of the total ca
length.

THREE-PHASE MOTOR MAXIMUM CABLE LENGTH (Motor to Service Entrance) (2)

Motor Rating		Copper Wire Size (1)										
Volts	HP	14	12	10	8	6	4	2	0	00	000	0000
208	1.5	320	510	800	1260							
	2	250	390	610	960	1500						
	3	180	290	450	710	1110	1690					
	5			300	470	730	1110	1690				
	7½				340	530	810	1230	1660			
	10				250	390	600	920	1240	1540		
	15					270	410	630	850	1060	1270	
	20						320	480	650	810	970	1150
	25							390	530	660	790	930
	30								430	540	650	750
230V	1.5	430	680	1070	1680							
	2	320	510	790	1250	1940						
	3	240	380	600	940	1470	2240					
	5		250	390	620	960	1470	2230				
	7½			290	450	700	1070	1630	2200			
	10				340	520	800	1220	1640	2050		
	15					360	550	830	1130	1410	1680	
	20						420	640	860	1070	1280	1510
	25						340	520	700	870	1040	1230
	30							420	570	710	850	1000
460V	1.5	1720										
	2	1280	2030									
	3	960	1530	2400								
	5	630	1000	1570	2470							
	7½	460	730	1150	1800	2810						
	10		550	850	1340	2090	3190					
	15			590	920	1430	2190	3340				
	20				700	1100	1670	2550	3440			
	25				570	890	1360	2070	2800	3500		
	30					730	1110	1690	2280	2850	3400	
	40						850	1300	1750	2190	2810	3070
	50						680	1040	1400	1750	2090	2450
	60							870	1180	1470	1760	2070
	75								950	1190	1420	1670
	100									890	1060	1240
575V	1.5	2640										
	2	1860										
	3	1490	2370									
	5	980	1560	2440								
	7½	720	1150	1800	2820							
	10	540	850	1340	2090							
	15		590	920	1440	2245						
	20			700	1090	1700	2600					
	25				890	1390	2130	3240				
	30				730	1130	1730	2640	3560			
	40					870	1330	2030	2730	3280		
	50						1060	1620	2190	2620	3128	
	60						900	1360	1840	2210	2640	3100
	75							1100	1490	1790	2130	2510

TABLE E

Electrical Data — 60 Hz Submersible Motor Pumps

HYDROPURCE

RATED HP	VOLTS	PH	SERVICE FACTOR	RATED HP AMPS	SERVICE FACTOR AMPS	CIR BREAK OR STANDARD FUSE	DUAL ELEMENT FUSE	KVA CODE	LOCKED ROTOR AMPS	WINDING RESISTANCE (OHMS)
4 Inch, Two Wire										
½	115	1	1.75	7.0	8.9	25	10	S	48.4	1.5- 1.9
	230	1	1.75	3.5	4.4	15	5	S	24.2	6.0- 7.4
¾	115	1	1.60	9.6	11.9	30	15	R	62.4	1.0- 1.3
	230	1	1.60	4.8	5.9	15	7	R	31.2	4.2- 5.2
1	230	1	1.50	6.4	8.0	20	9	N	40.2	2.7- 3.4
1	230	1	1.40	8.2	9.6	25	12	M	46.0	2.2- 2.8
1½	230	1	1.30	10.6	13.1	35	15	L	56.8	1.5- 1.9
4 Inch, Three Wire										
½	115	1	1.75	7.0	8.9	25	10	N	32.8	BY 1.5-1.9 AY 5.7-7.1
	230	1	1.75	3.5	4.4	15	5	N	16.4	BY 6.0-7.4 AY 23.4-29.6
¾	115	1	1.60	9.6	11.9	30	15	M	46.0	BY 1.0-1.3 AY 3.8-4.7
	230	1	1.60	4.8	5.9	15	7	M	23.1	BY 4.2-5.2 AY 15.1-19.0
1	230	1	1.50	6.4	8.0	20	9	M	33.1	BY 2.7-3.4 AY 11.0-13.8
1	230	1	1.40	8.0	9.6	25	12	L	42.0	BY 2.2-2.8 AY 8.5-11.7
1½	230	1	1.30	9.1	11.5	30	15	J	52.0	BY 1.5-1.9 AY 6.2-8.5
2	230	1	1.25	10.8	13.2	35	15	G	51.0	BY 1.6-2.3 AY 5.2-7.1
3	230	1	1.15	14.0	16.5	45	20	F	71.0	BY 0.9-1.5 AY 3.0-4.6
5	230	1	1.15	23.0	27.5	80	30	F	118.0	AY 0.68-1.0 AY 2.1-2.8
1½	200	3	1.30	6.0	7.3	20	9	K	39.0	2.4- 3.4
	230	3	1.30	5.2	6.3	20	8	K	34.0	3.2- 4.1
	460	3	1.30	2.6	3.1	15	4	K	17.0	11.3-15.0
	575	3	1.30	2.1	2.5	15	3	K	14.0	15.1-20.0
2	200	3	1.25	8.0	9.4	25	10	L	53.0	1.9- 2.4
	230	3	1.25	7.0	8.2	20	10	L	46.0	2.4- 3.0
	460	3	1.25	3.5	4.1	15	5	L	23.0	9.7-12.0
	575	3	1.25	2.8	3.3	15	4	L	18.0	13.6-18.9
3	200	3	1.15	11.5	13.1	35	15	K	70	1.3- 1.7
	230	3	1.15	10.0	11.4	30	15	K	61	1.8- 2.2
	460	3	1.15	5.0	5.7	15	7	K	31	7.0- 8.7
	575	3	1.15	4.0	4.6	15	6	K	24	11.0-13.6
5	200	3	1.15	17.5	20.0	50	25	K	120	0.70-0.94
	230	3	1.15	15.2	17.4	45	20	K	104	0.93- 1.2
	460	3	1.15	7.6	8.7	25	10	K	52	3.6- 4.4
	575	3	1.15	6.1	7.0	20	8	K	42	5.6- 6.9
7½	200	3	1.15	27.0	30.8	80	35	J	156	0.55-0.68
	230	3	1.15	23.5	26.8	70	30	J	143	0.76-0.93
	460	3	1.15	11.7	13.4	35	15	J	72	2.4- 3.4
	575	3	1.15	9.3	10.7	30	12	J	57	3.5- 5.1
10	460	3	1.15	15.6	17.6	45	20	K	108	1.8- 2.3
	575	3	1.15	12.5	14.1	40	20	K	86	2.8- 3.5
6 Inch										
5	230	1	1.15	26.0	29.5	80	35	E	99	BY 0.55-0.68 AY 1.5-1.9
7½	230	1	1.15	34.5	40.0	100	45	E	157	BY 0.40-0.50 AY 1.0-1.2
10	230	1	1.15	45.0	52.0	150	60	F	223	BY 0.27-0.33 AY 0.66-0.78
5	200	3	1.15	17.0	19.1	50	25	J	103	0.70-0.88
	230	3	1.15	14.8	16.6	45	20	J	90	0.87- 1.1
	460	3	1.15	7.2	8.3	25	10	J	45	3.1- 4.1
	575	3	1.15	5.9	6.6	20	8	J	36	5.7- 7.0
7½	200	3	1.15	24.2	27.5	70	30	J	156	0.48-0.59
	230	3	1.15	21.0	23.9	70	30	J	136	0.56-0.71
	460	3	1.15	10.5	11.9	30	15	J	68	2.1- 2.9
	575	3	1.15	8.4	9.5	25	12	J	54	4.0- 4.8
10	200	3	1.15	32.1	36.8	100	40	K	235	0.28-0.46
	230	3	1.15	27.9	32.0	80	35	K	204	0.35-0.55
	460	3	1.15	13.9	16.0	40	20	K	102	1.5- 2.1
	575	3	1.15	11.1	12.8	35	15	K	82	2.5- 3.2

nepcco
New England Pollution Control Co., Inc.
Equipment Division
29 Wall Street, Foxboro, MA 02035 617/543-8458

March 1 , 1984

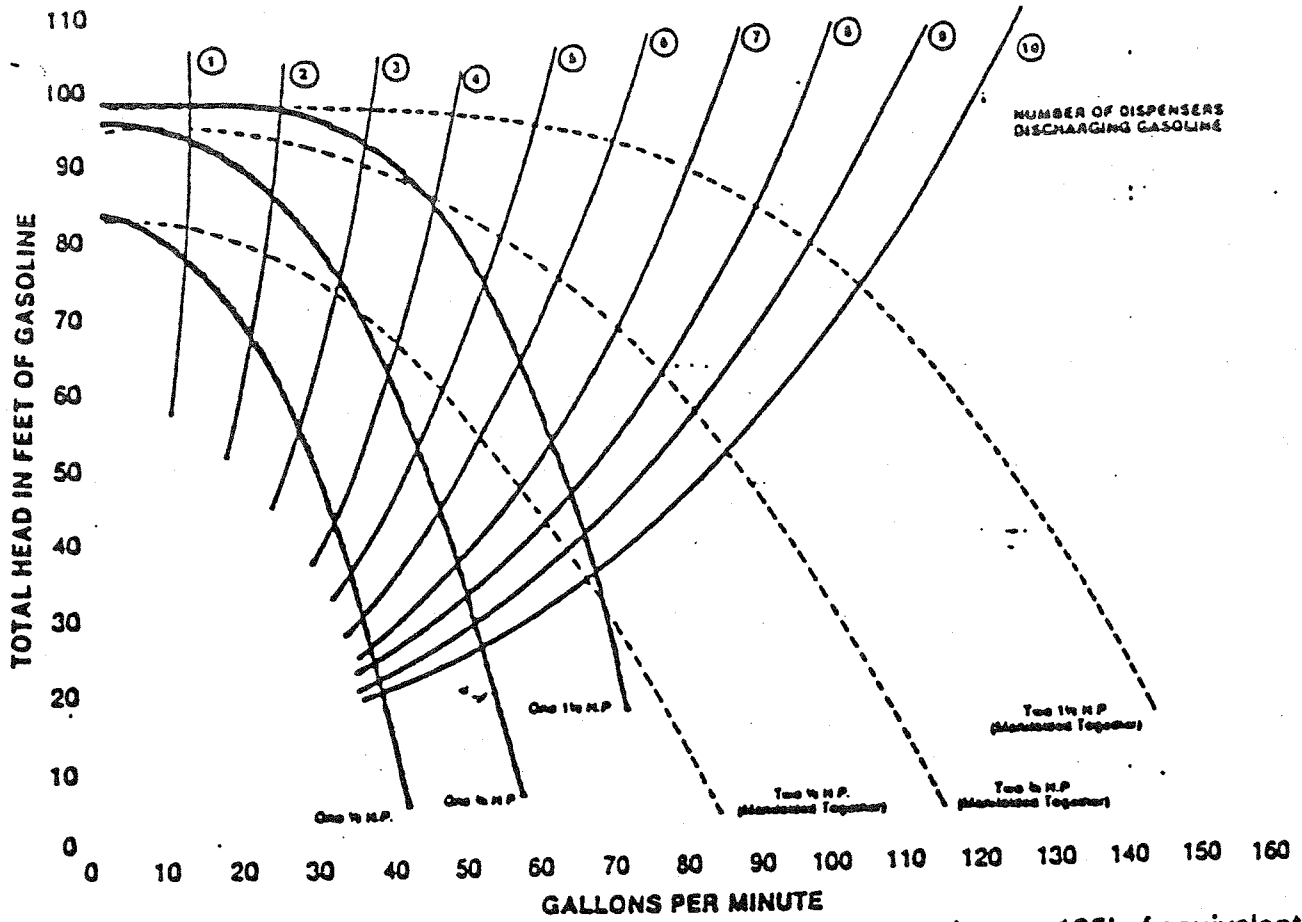
WARRANTY CONDITIONS

This warranty is a LIMITED warranty; anything in the warranty notwithstanding. Implied warranties for particular purpose and merchantability shall be limited to the duration of the express warranty. The manufacturer (NEPCCO) expressly disclaims and excludes any liability of consequential or incidental damages for breach of any express or implied warranty.

Nepcco Petropurge Systems are warranteed as to workmanship, material, and performance when properly installed, used, and cared for. Should any part or parts prove defective within 12 months from date of purchase, it will be replaced f.o.b. destination without charge, provided the part (or parts) is returned transportation charges prepaid. Exception to this warranty will be hoses and pump seals, these items will be subject to the same warranty except for a period of six (6) months from date of purchase.

No allowance will be made for labor, transportation, or other charges incurred in the replacement or repair of defective parts by the customer. This warranty does not apply when damage is caused by sand or abrasive materials pumped with the fluid, lightning, improper voltage supply, careless handling, or improper installation.

PETROPURGE PUMP
PERFORMANCE AND SELECTION CHART



1. Characteristics curves showing ⅓, ¾ and 1½ H.P. pumps, each operating individually and as two manifolded together.
2. Piping pressure loss — 125' of equivalent 2" pipe and fittings.
3. Curves are based upon use of a typical automatic nozzle at middle setting.

nepcco

Equipment Division
29 Wall Street
Foxboro, MA 02035
(617) 543-8458

4" Pump-Motor Assembly

A) The permanent split-phase capacitor motor gives you the option of using a control box or direct wiring.

B) An on-winding thermal over-current protector prevents premature motor failure from overheating.

Ambient temperature overload can occur as follows:

(1)205°F = Is Overload Temperature

(2)120°F / 85°F = Motor Heat Rise. If ambient temperature or product is above this temperature, overload may occur.

(Check amperage draw before accepting this as cause for motor cut-off. If high amperage draw is present, it is probably not ambient temperature overload.)

(1)Overload protector opens at approximately this temperature and stops motors.

(2)Motor is continuous duty rated. Temperature rises to approximately 120°F and holds.

C) Unit is cooled and lubricated by the product it pumps. Approximately 10% of maximum flow capability is required to properly cool and lubricate unit. I.e., 1/3 HP-4 GPM, 3/4 HP-6 GPM, 1-1/2 HP-8 GPM. Never Run Dry.

D) Unit is designed to pump petroleum fuels with a maximum specific gravity of .95 and maximum viscosity of 70 S.S.U. at 60°. Attempts to exceed these limits will result in overheating.

NOTE: See Page 8 for Symptoms, Probable Causes and Suggested Action Section.

ELECTRICAL SERVICE INFORMATION

Model #	HP	Volts		Max Load Amps	Locked Rotor Amps	Winding Resistance (Ohms)		
		Min	Max			Blk/Orange	Red/Orange	Black/Red
P33R1	1/3	208	250	4.0	13	7.4-8.1	16.1-17.8	23.5-25.99
P75S1	3/4	208	250	6.5	22	3.6-4.0	9.6-10.6	13.2-14.7
P150S1	1-1/2	208	250	10.5	42	2.0-2.2	5.2-5.8	7.2-8.0
50hz. Single Phase Models								
P7553-2	¼	200	250	4.6	14.3	5.8-6.2	12.2-13.5	18.0-20.0
P7553-3	¼	200	250	5.8	18.6	4.5-4.9	11.7-13.0	16.2-17.9
P15053-3	1½	200	250	10.0	34.5	2.2-2.4	7.9- 8.7	10.1-11.2

The wire color coding above is for the 3 wires of the motor winding itself. When checking resistances of the winding the most easily accessible place is the explosion proof capacitor box of the Petropurge Pump. The following chart will match the motor winding color code with the color coding in the box:

Box Wire Colors	Motor Winding
Yellow	Orange
Black	Black
Red	Red
Blue (Ground)	None

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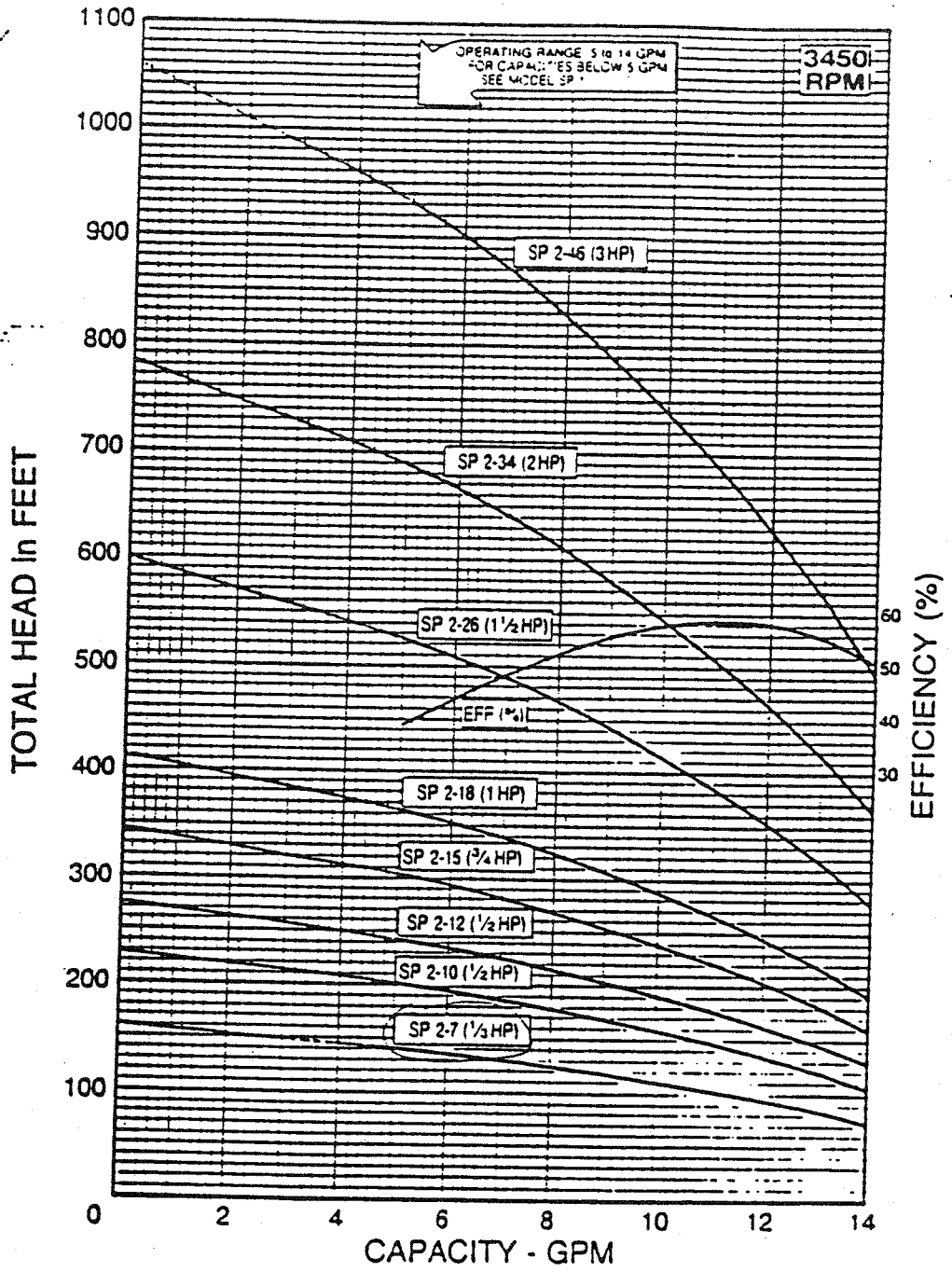
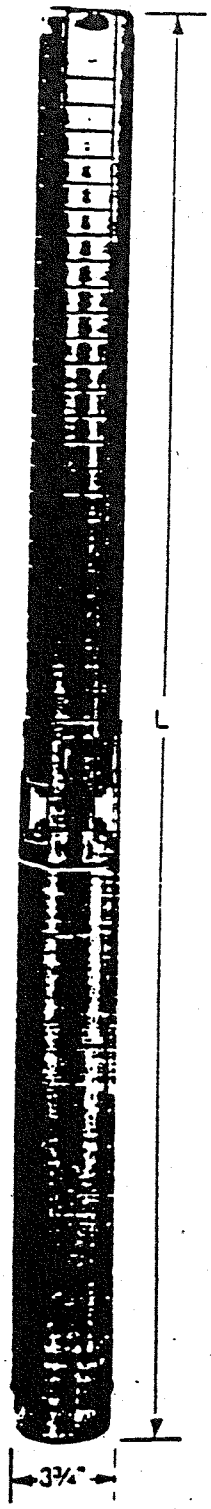
29 Wall Street, Foxboro, MA 02035

Performance Curves



MODEL SP 2

NOM. FLOW RATE
10 GPM
FLOW RANGE
5 to 14 GPM
PUMP OUTLET
1" NPT



DIMENSIONS AND WEIGHTS

MODEL NO.	HP	LENGTH (L)	APPROX. UNIT SHIPPING WT. (LBS.)
SP 2-7	⅓	22⅛"	27
SP 2-10	½	26⅛"	31
SP 2-12	½	27¾"	32
SP 2-15	¾	31½"	38
SP 2-18	1	32¾"	43
SP 2-26	1½	44½"	55
SP 2-34	2	55⅞"	70
SP 2-46	3	68⅜"	92

Specifications are subject to change without notice

SUBMERSIBLE MOTOR COOLING

When the pump is set below any screen openings or below the bottom of the casing a top feeding well condition can exist which reduces the rate of cooling water flow past the motor.

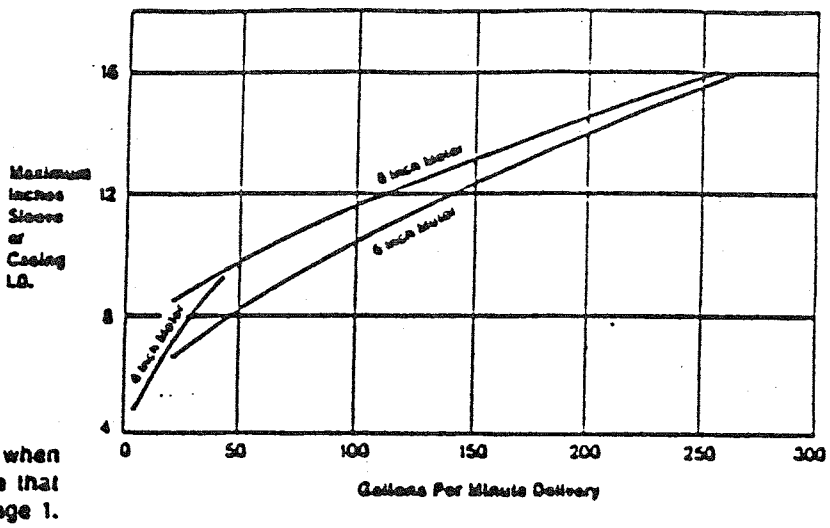
If the flow rate is less then specified a flow inducer sleeve or an alternate method of increasing water velocity past the motor must be used for proper cooling.

MINIMUM VELOCITY PAST THE MOTOR

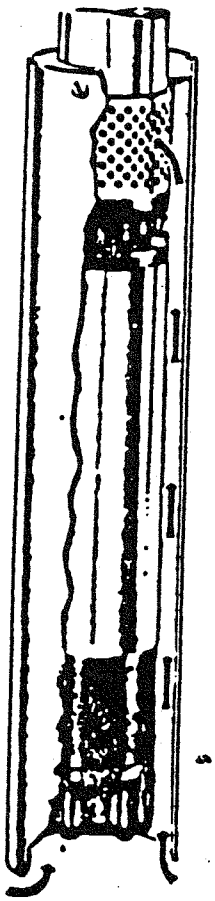
4" dia. motor — .25 ft./sec.
6" dia. motor — .5 ft./sec.
8" dia. motor — .5 ft./sec.

A flow inducer sleeve should always be used when the pump is in a large body of water. Make sure that such an installation is grounded as warned on page 1.

COOLING FLOW REQUIREMENTS



FLOW INDUCER SLEEVE



A flow inducer sleeve is a tube over the motor, closed off above the pump intake and extended to the bottom of the motor or lower. The sleeve material is corrosion resistant metal or heavy plastic.

FLOW INDUCER DISCHARGE TUBE

If the casing is too small for a flow sleeve and the pump cannot be raised a tube may be installed as follows:

a) Tap a ¼" tube (ID) into the pump outlet (below check valve).
b) Clamp it to the pump and motor
c) Aim tube upward so flow is introduced 1 foot below the motor
d) Protect tube with spacers and angle iron.

SP1, SP2, SP4 Cylindrical Shaft Pumps

DISASSEMBLY

Note:
For Position Numbers, see the drawing in the Spare Parts List starting on page 2.09 and for Service Tools, see page 6.01.

Before beginning, it is suggested the pump-end be marked to indicate the position and order of the original components. This facilitates in locating specific areas of wear or damage. With a marking pen, draw a straight line down the entire length of the pump-end. One of the straps makes a convenient straight edge for this purpose. Number the chambers in order, starting with the first chamber above the suction interconnector. During disassembly, lay out the parts in the order and orientation in which they are removed to aid in proper reassembly.

Figure 1
Use a screwdriver and a rubber mallet to slide the cable guard (pos. 18) up and free the clips in the discharge chamber (pos. 1) and the suction interconnector (pos. 14). The recess on the side of the cable guard must clear the locking tab on the suction interconnector. On earlier model pumps and on pumps with 32 or more stages, the cable guard is held down by two straps (pos. 17). Using a 13mm wrench remove one nut (pos. 19) and strap, then pull the cable guard free.

Remove the motor nuts (pos. 19a) holding the pump and the motor together. Lift the pump-end off the motor.

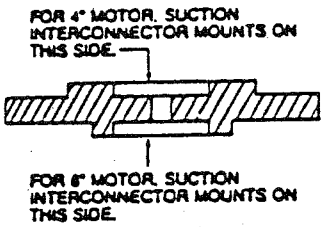


Figure 2.
Mounting plate (P/N SV.0049) cross-section

Select the correct side of the mounting plate (P/N SV.0049) which is determined by the diameter of the motor used (see Spare Parts List for motor diameter). The suction interconnector will securely seat on the correct side of the mounting plate.

Select the proper shaft spacer (pos. C) for the specific pump model (see Service Tools, page 6.01).

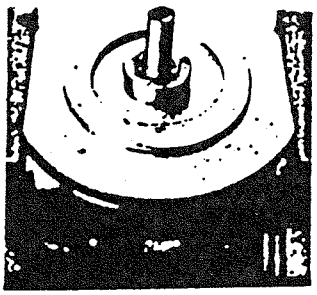


Figure 3
Mounting plate and shaft spacer. Mounting plate should be clamped into a vise or bolted to a bench.

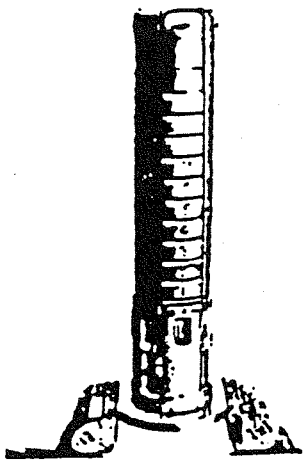


Figure 4
Position the pump-end on the mounting plate and secure the shaft to the plate by means of the shaft spacer and the socket head cap screw (P/N SV.0074).

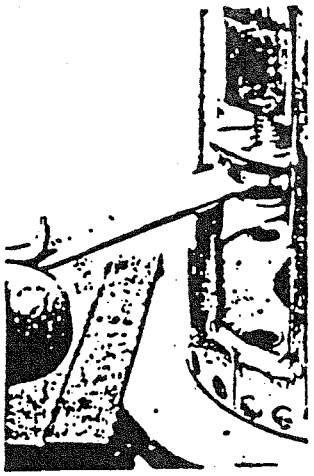


Figure 5
Use a 13mm wrench to remove the strap nuts (pos. 19).

Remove all straps (pos. 17) and dismantle the pump in the following order:

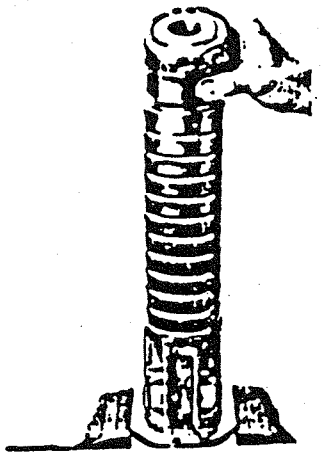


Figure 6
Lift the valve housing (pos. 1) off the upper intermediate chamber (pos. 4). If the housing sticks, it may be loosened by gently tapping it on the side with a rubber mallet.

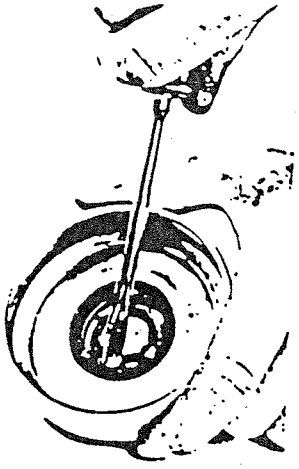


Figure 15
If the seal ring (pos. 7) is worn, use a screwdriver to pry it up and remove it from the chamber.

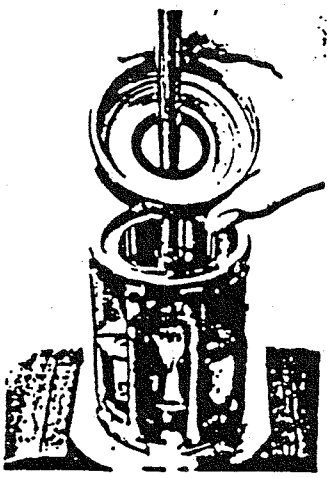


Figure 16
Remove lower intermediate chamber (pos. 10).

Figure 17
If the seal ring (pos. 7) is worn, use a screwdriver to pry it up and remove it from the chamber.

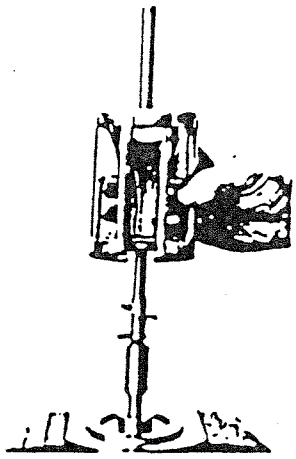


Figure 18
Lift the suction interconnector (pos. 14) off the mounting plate.

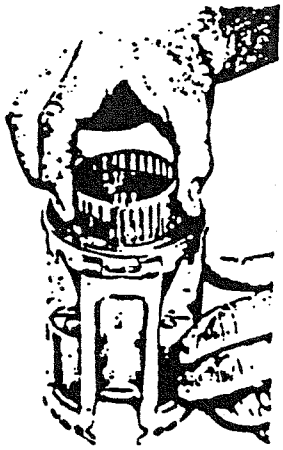


Figure 19
Remove the strainer (pos. 15) from the suction interconnector.

The pump is now disassembled.

Before assembly, clean and check all parts. Replace defective or worn parts. See Spare Parts List for part numbers.

ASSEMBLY

Note:
For position numbers, see the drawing in the Spare Parts List starting on page 2.09 and for service tools, see page 6.01.

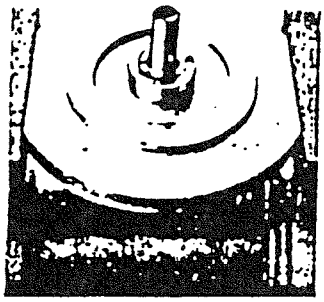


Figure 1
Mounting plate and shaft spacer.

Select the correct side of the mounting plate (P/N SV.0049) which is determined by the diameter of the motor used (see Spare Parts List for motor diameter). The suction interconnector will securely seat on the correct side of the mounting plate.

Select the proper shaft spacer (pos. C) for the specific pump model (see Service Tools, page 6.01).

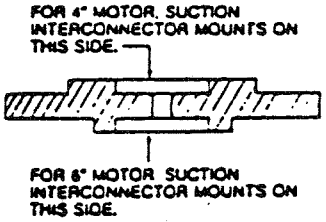


Figure 2
Mounting plate (P/N SV.0049) cross section.

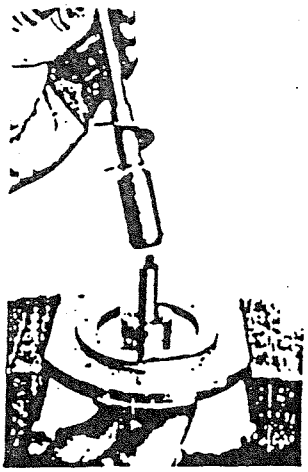


Figure 3
Fit the shaft (pos. 16) to the mounting plate by means of the shaft spacer and the socket head cap screw (P/N SV.00 74). Shaft must be clean and free of oil.

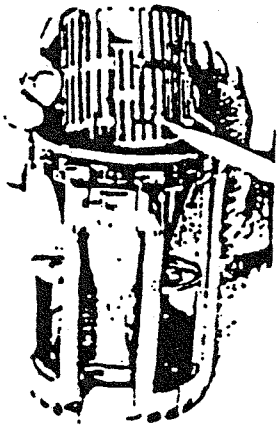


Figure 4
Recess in strainer (pos. 15) must be aligned with indentation in suction interconnector (pos. 14) for motor cable. Press together the strainer and insert into the suction interconnector.

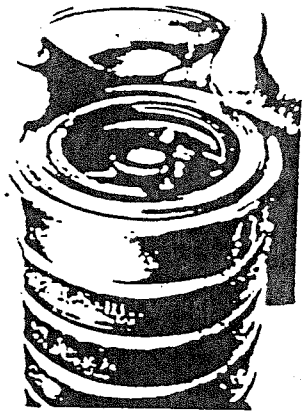


Figure 7
Remove the check-valve cone (pos. 2).

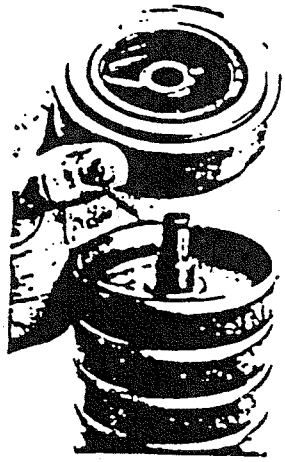


Figure 8
Remove the upper intermediate chamber (pos. 4).

Note:
On models with a large number of stages, the valve housing and the upper intermediate chamber are welded together and are removed as an integral unit. In this case, skip figures 9, 10 and 11. See the Spare Parts List for specific models with this construction.

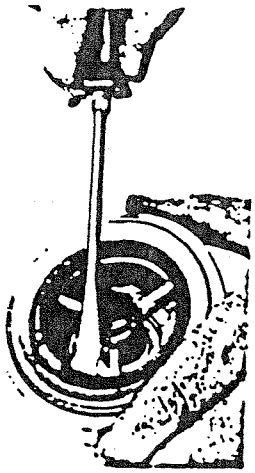


Figure 9
If the check-valve seat (pos. 3) is worn, use a screwdriver to pry it up and remove it from the chamber.

Figure 10
The shaft bearing driver kit (pos. J) P/N SV.0280 consists of 4 parts. This kit is used for removal and installation of shaft bearings which are shown in the foreground. See Service Tools, page 6.02 for identification of parts.

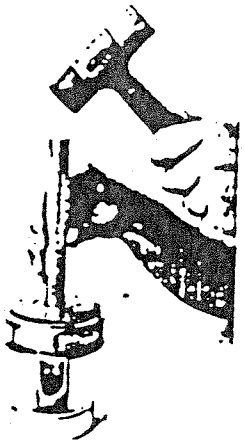


Figure 11
Use tool P/N's SV.0282, SV.0283-1 and SV.0283-2 from the shaft bearing driver kit (P/N SV.0280) to remove the upper bearing (pos. 6) from the upper intermediate chamber.

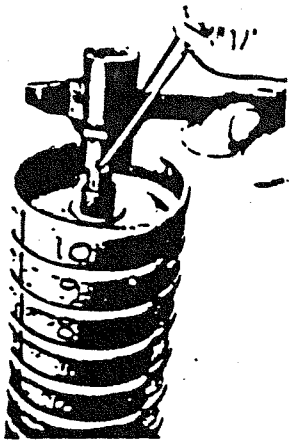


Figure 12
Slide the split-cone nut wrench and driver (P/N SV.0182) down over the shaft. Move the retaining wire to spread the two prongs on the wrench. Slide the wrench onto the split-cone nut (pos. 11) and release the wire, so the prongs fit into the two holes in the split-cone nut.

Using the split-cone nut wrench and driver (see Fig. 12), loosen the split-cone nut (pos. 11), right-hand threads; but do not remove the nut.

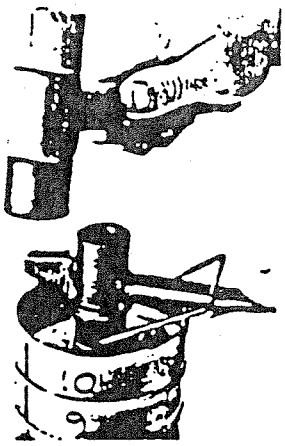


Figure 13
Turn the split-cone nut wrench over and tap the split cone (pos. 12) down by hitting the end of the wrench. This releases the grip of the split cone from the shaft.

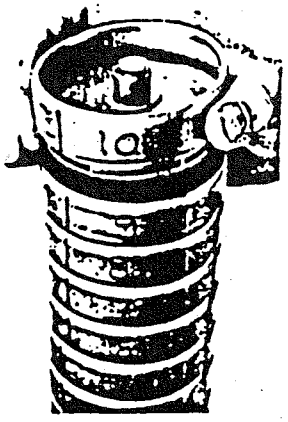


Figure 14
The impeller (pos. 13), split cone and nut can then be removed by pulling up on the intermediate chamber (pos. 9).

If the shaft is badly worn or damaged, it may be necessary to remove the split-cone nut and impeller in order to remove the split cone. The split cone can then be loosened by inserting a screwdriver in the split of the cone and gently prying sideways to open the cone.

Repeat the above steps until all impellers, split cones, nuts and intermediate chambers have been removed.

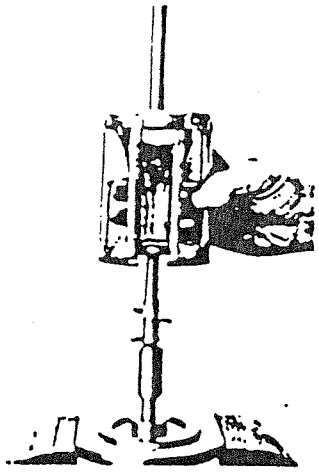


Figure 5
Slide the section interconnector down over the shaft and seat on the mounting plate.

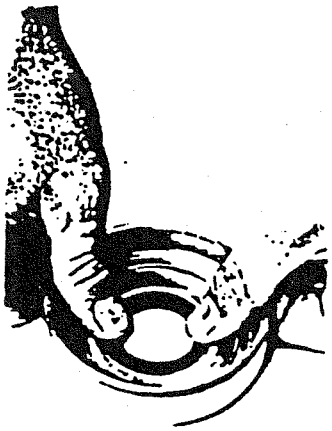


Figure 6
Push the seal ring (pos. 7) into the lower intermediate chamber (pos. 10). The rubber seal lip faces up. A rubber mallet may be used to tap seal ring into place.

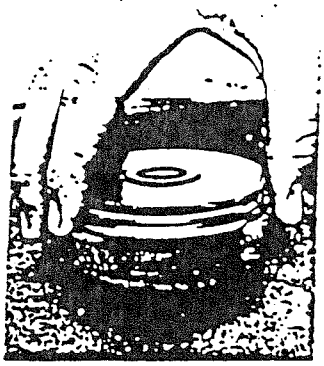


Figure 7
Optional sealing compound may be applied to mating surfaces on intermediate chambers by spreading a layer on a piece of foam and then pressing the part against the foam.

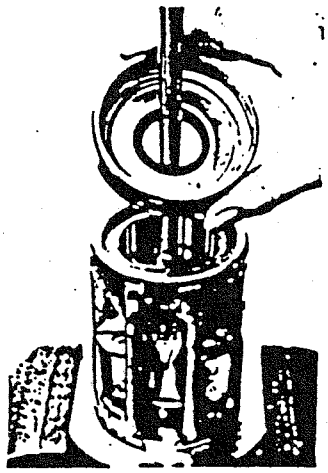
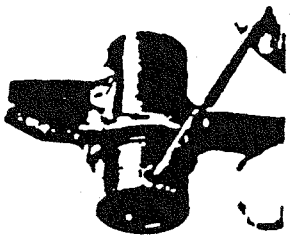


Figure 8
Set lower intermediate chamber on suction interconnector and gently tap into place with a rubber mallet.

Figure 9
Assemble the split cone (pos. 12) and split-cone nut (pos. 11) into an impeller (pos. 13). The threaded portion of the split cone is inserted up through the bottom of the impeller. With the two holes in the split cone nut facing down towards the top of the impeller, screw the nut on with about 3 turns.

Note:
When split cone and split-cone nut are both stainless steel, use Mobil Grease FM-2 or equivalent on the split-cone nut threads to prevent galling.



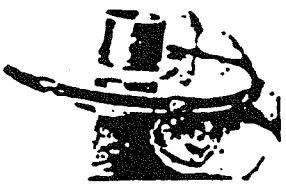


Figure 10
Install split-cone nut wrench and driver (P/N SV.0182) on the split-cone nut. Wrench prongs must fit into holes in the split-cone nut.

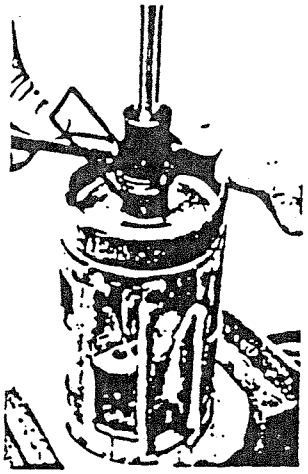


Figure 11
Push the impeller assembly onto the shaft. If split cone collapses, the impeller assembly will not slide onto shaft. In this case, pull up on the impeller while pressing down on the wrench to release the split cone. Firmly seat the impeller assembly into the lower intermediate chamber seal ring.

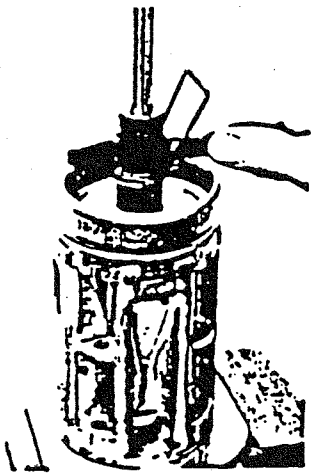


Figure 12
Torque split-cone nut to 6-7 lbf-ft. Do not over torque the nut, which could strip threads or deform the impeller.

Before continuing assembly, press seal rings (pos. 7) into all intermediate chambers (pos. 9) as per Fig. 6 on this page.

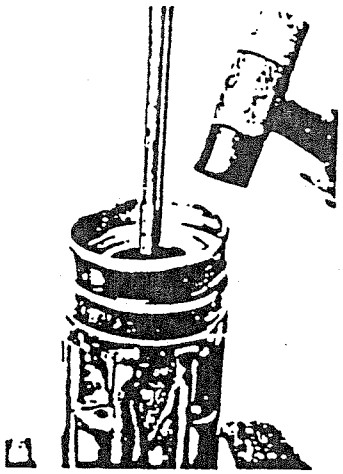


Figure 13
Continue the assembly until all intermediate chambers and impellers have been installed.

Figure 14
Place the upper intermediate chamber (pos. 4) on a soft surface (wood, rubber or sandbag). Using tool P/N SV.0281 from Shaft Bearing Driver Kit (P/N SV.0280), drive upper bearing (pos. 6) into bearing retainer.

Figure 15
Metal lip on upper bearing faces up and rests on bearing retainer. For clarity, the bearing is shown here before it is driven all the way down.

Figure 16
Using a rubber mallet, tap check-valve seat (pos. 3) into upper intermediate chamber. The rubber lip faces up and the stainless steel part of the seat faces down.

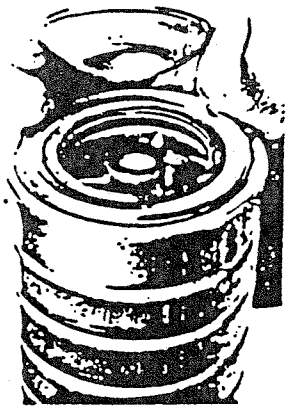


Figure 17
Install the upper intermediate chamber, the check-valve cone (pos. 2) and the valve housing (pos. 1).

Note:
On pumps with a large number of stages, the valve housing and upper intermediate chamber are welded together (discharge chamber, pos. 1a). For models with this welded configuration see the Spare Parts List.

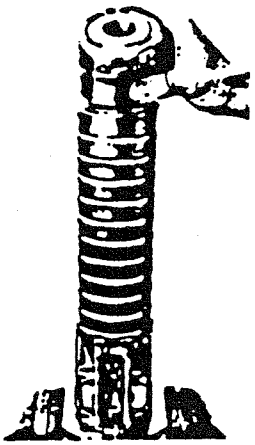


Figure 18
The valve housing or discharge chamber is turned so that the holes for the safety cable are located opposite the motor cable opening in the suction interconnector.

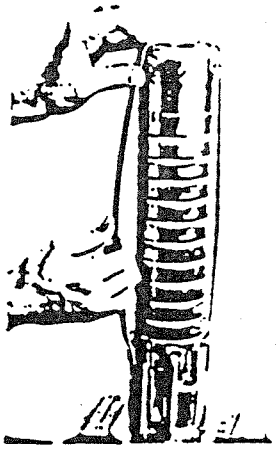


Figure 19
Insert top of strap (pos. 17) in slot, hold down with one hand and with the other hand slide strap stud into hole in suction interconnector. Install all four straps.

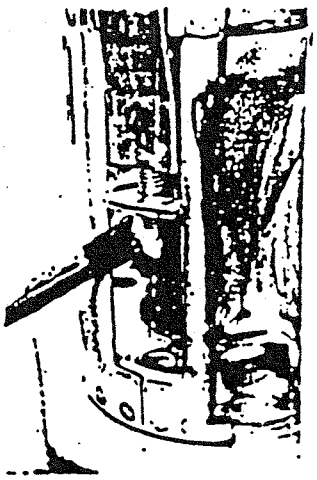


Figure 20
To prevent galling of stainless steel nuts on stainless steel strap studs, apply Mobil Grease FM-2 or equivalent to strap-stud threads.

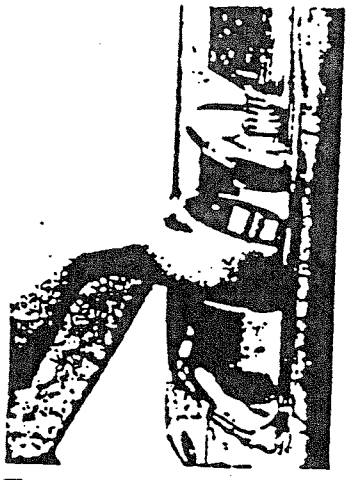


Figure 21
Using torque wrench (P/N SV.0261), torque strap nuts (pos. 19) diagonally to 13 lbf-ft.

Remove the pump-end from the mounting plate and check the shaft end-play per Table A.

TABLE A			
NOMINAL MOTOR DIA.	MEASURED FROM:	H*	
		SHAFT DOWN	SHAFT UP
4 inch	Machined recess for the motor contact surface of the suction interconnector to the washer inside the coupling.	Less than or equal to: 1.463 inches (37.15mm)	Greater than or equal to: 1.541 inches (39.15mm)

* See Figure 24 for location of dimension H.

Note:
The end-play measurement will vary from pump type to pump type. If the end-play is not as stated above, the pump has been incorrectly assembled and must be rebuilt. Generally, insufficient end-play is caused by assembly on the wrong shaft spacer, improper seating of the impellers or over tightening of the split-cone nuts.

Before attaching the pump-end to motor, check motor shaft height. This height is measured from the pump-end mounting surface on motor to the top or end of the motor shaft. See Table B for dimensions.

TABLE B	
NOMINAL MOTOR SIZE	SHAFT HEIGHT*
4 inch NEMA	1.496 inches (38.00mm) to 1.508 inches (38.30mm)

* If this measurement is not as specified, it may mean the thrust bearing is worn or defective and the motor must be replaced.

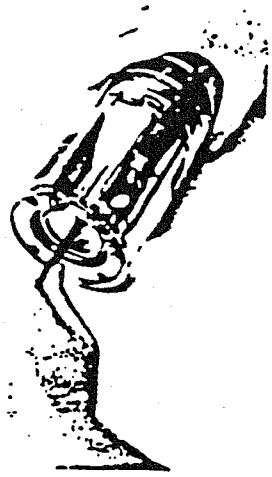


Figure 22
To check shaft end-play with shaft down, screw a bolt into threaded hole in end of shaft. Pull on bolt until shaft is all the way out. Remove bolt.

To check shaft end-play with shaft up, screw bolt into end of pump shaft and push the shaft all the way in. Remove bolt and measure the depth.

Note:
The shaft-down depth must be less than or equal to the value in Table A. The shaft-up depth must be greater than or equal to the value in Table A.

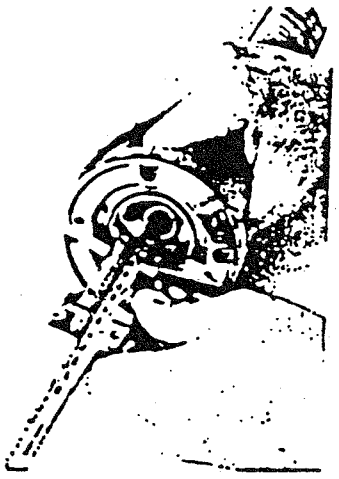


Figure 23
Using a depth gauge, measure from the motor mounting surface to the contact disc inside the motor coupling (see Fig. 24). See Table A for depth.

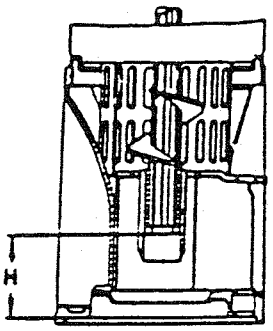


Figure 24
Shaft end-play for pump with a 4 inch motor. See Table A.

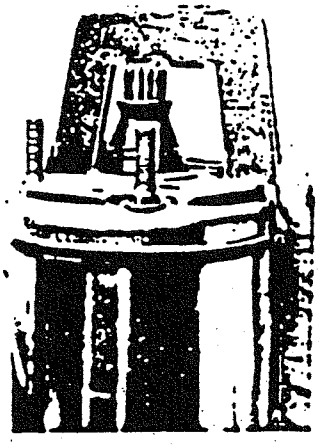


Figure 25
For 4 inch NEMA (National Electrical Manufacturers Association) motor, use tool P/N SV.0114 (shown) or a depth gauge to check shaft height. See Table B.

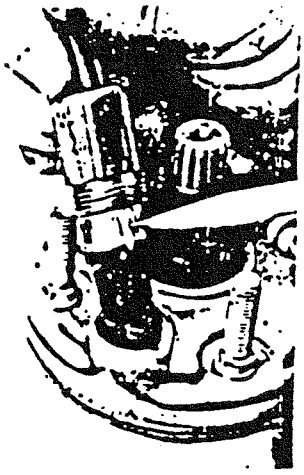


Figure 26
On Franklin motors, insert motor plug into motor socket ensuring key on plug is aligned with keyway in the socket. Press plug firmly into the socket and securely tighten the jam nut (Do not overtighten the jam nut). Torque to 20-25 lbf-ft for 4 inch motors.

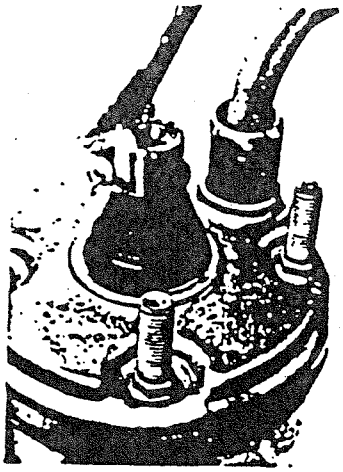


Figure 27
Use Mobil Grease FM-2 or equivalent on motor-shaft spline and motor mounting studs.

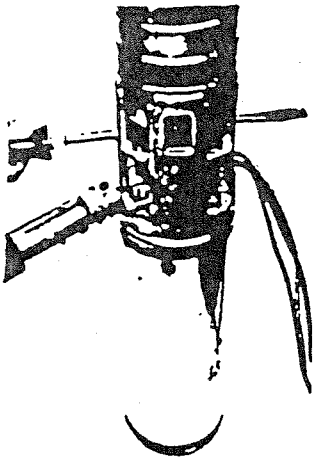


Figure 29
Place nuts on motor mounting studs and tighten diagonally. For 4 inch motor, torque nuts to 13 lbf-ft. Torque wrench (P/N SV.0261) may be used on 4 inch motor nuts.

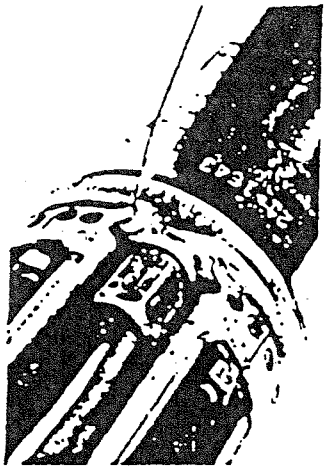


Figure 31
Use a screwdriver to slightly pry up the two tabs on suction interconnector as shown in Fig. 31.

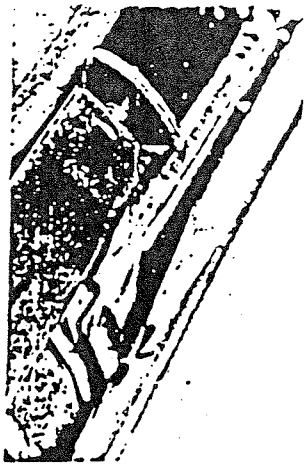


Figure 34
Make sure cable guard locks into place (tab on suction interconnector fits into recess on cable guard).

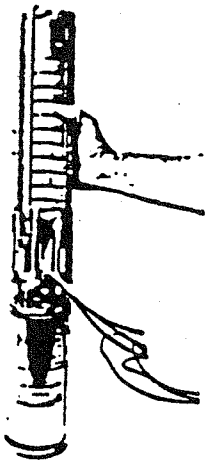


Figure 28
Check and clean motor flange, suction interconnector contact surface, motor splines and pump shaft couplings. Mount the pump on the motor so the cable opening in the suction interconnector will fit over the motor cable.

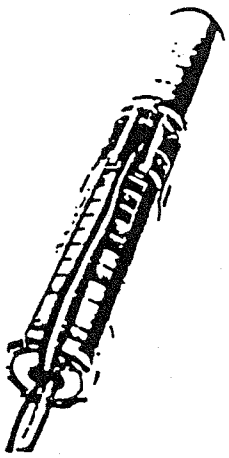


Figure 30
Straighten out motor lead and tuck into end of pump.

NOTE:
For torque values see Table C on next page.

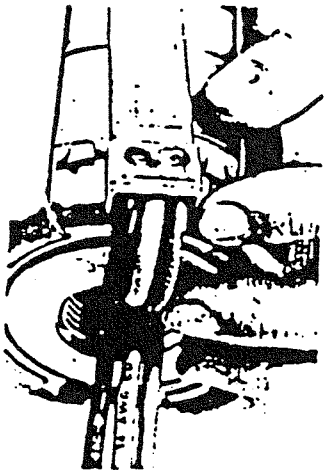


Figure 32
Insert tabs at top of cable guard into clips in discharge chamber.

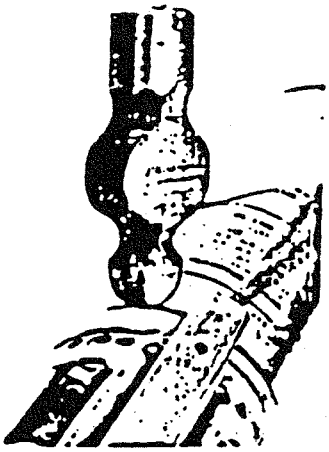


Figure 33
Insert bottom of cable guard under tabs on suction interconnector. Tap tabs down to hold cable guard in place.

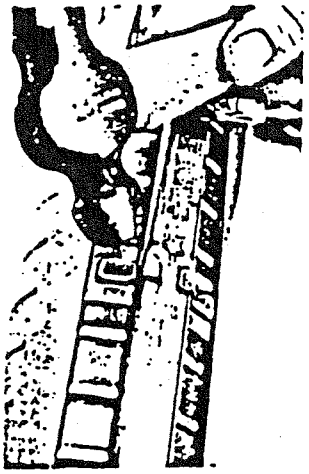


Figure 35
If pump has 32 or more stages, loosen one strap nut and insert holder (pos. 81) under straps. Use a hammer to bend tabs into recesses in the middle of the cable guard. Then retorque all four strap nuts to 13 lbf-ft.

Note:
If cable guard is of the earlier style which is held down by straps (pos. 17), loosen one strap nut and fit cable guard into place. Then retorque all four strap nuts to 13 lbf-ft.

Give the pump a confidence test to check for noise, electrical current draw and proper flow for a given head.

The pump is now ready to be installed in a well.

TABLE C		
POSITION	DESCRIPTION	TORQUE
11	Split-cone nut	6-7 lbf-ft
19*	Strap nut	13 lbf-ft
19a*	4" motor nut	13 lbf-ft
	6" motor bolt	36–43 lbf-ft
19b	Spline-shaft top nut	8 lbf-ft
...	4" motor jam nut	20-25 lbf-ft
	6" motor jam nut	60-70 lbf-ft

* Tighten the nuts diagonally to the specified torque to assure even pressure.

2/18/87

MULTIWELL INSTALLATION INSTRUCTIONS

MOUNTING:

Multiwell* has been designed for outdoor installation; however, we recommend that some protection from extreme weather conditions be incorporated when possible. Four mounting tabs have been provided on the rear surface of the Multiwell* cabinet to permit mounting on a wall or other suitable surface. Although not required, a vertical surface is recommended. The Multiwell* enclosure is not explosion proof and care should be exercised to keep its mounting location in a non-hazardous location.

ELECTRICAL CONNECTIONS: (REFER TO FIG. 1)

1. GENERAL:

Power to and from the Multiwell* cabinet is via rain tight conduit in compliance with the National Electrical Code and local wiring requirements. Access holes for the conduit have not been provided since their location will vary depending on the site layout. In general, power wiring from the main feed should enter the Multiwell* enclosure at or near the top, and wires to the pump motors and probes should exit the enclosure at the bottom.

2. INPUT POWER

220 volt 1 phase power for the Multiwell* is connected via TB1 at the top of the sub-panel. Provision is made for wire size.

up to #4 AWG. Input wire should be fused and sized for the combined motor loads to be used. The maximum current for a Hydropurge motor is 15 amperes (approx. 2 h.p.) and for a Petropurge motor, 10 amperes (a Nepcco std. Petropurge motor draws approx. 5 Amps). For standard Hydropurge and Petropurge motor loads, we recommend 80 amp service to the Multiwell* enclosure.

3. OUTPUT POWER

220 volt, 1 phase voltage for Hydropurge and Petropurge pumps is available on TB 2 at the lower right hand side of the enclosure. Power available is limited to 15 amps on Hydropurge ckts, 10 amps on Petropurge ckts. L1 & L2 represent the 220 volts power leads with an adjacent ground connection for each motor.

Power to TB2 is controlled via the logic cards, LC1 - LC4, and probe units. Logic Card #1 controls power for Hydropurge #1 and Petropurge #1. Logic card #2 controls Hydropurge #2 and Petropurge #2, and so on.

Probe #1 provides the control signals for logic card #1 and therefore Hydropurge #1 and Petropurge #1. Probe #2 provides signals for Logic Card #2, and so on.

4. PROBE INPUTS

The probe inputs are connected via screw terminals at the bottom of the sub-panel on TB3, and TB5 respectively.

MULTIWELL INSTALLATION

Multiwell* probes are equipped with spade lugs (instead of a connector) and only one probe is necessary to control both Hydropurge and Petropurge. Connections should be by wire color as shown in Fig. 1.

5. TANK OVERFILL CONNECTIONS:

Tank overfill connections are made on TB7 with one wire from each Tank Overfill probe connected to TB7 - 1 (TNK Full Common) and the other to terminals 2,3,4 & 5 as noted in Fig. 1.

The Multiwell* has been set up to accommodate a separate recovery task for each Petropurge pump. If a single collection tank is to be used for more than one pump, connect a jumper on TB7 between terminals 2,3,4, & 5 (terminals 2 - 5 all tied together). This will shut down all Petropurges when a tank full signal is received. In this instance, the single tank full probe connections should be made between terminals 1 and 2 on TB7.

6. TROUBLESHOOTING:

Fig. 2 is a chart showing the various components affecting each Hydropurge and Petropurge for troubleshooting if necessary.

	CKT BKR	SOLID STATE RELAYS	LOGIC CARDS	PROBE TERMI-NALS	TANK FULL TERMI-NALS (TB7)	PWR OUT (TB2)
HYDRO 1	CB1 (15A)	K1 K2	LC1	TB3(1-6)	-	1,2
HYDRO 2	CB3 (15A)	K5 K6	LC2	TB3(7-12)	-	4,5
HYDRO 3	CB5 (15A)	K9 K10	LC3	TB5(1-6)	-	7,8
HYDRO 4	CB7 (15A)	K13 K14	LC4	TB5(7-12)	-	10,11
PETRO 1	CB2 (10A)	K3 K4	LC1	TB3(1-6)	1 & 2	13,14
PETRO 2	CB4 (10A)	K7 K8	LC2	TB3(7-12)	1 & 3	16,17
PETRO 3	CB6 (10A)	K11 K12	LC3	TB5(1-6)	1 & 4	19,20
PETRO 4	CB8 (10A)	K15 K16	LC4	TB5(712)	1 & 5	22,23
PS1	F1 & F2	-	-	-	-	-
PS2	F1 & F2	-	-	-	-	-

FIGURE 2

NOTE:

Petropurge circuit breakers (CB2, CB4, CB6, CB8) are rated at 10 amps.

Hydropurge circuit breakers (CB1, CB3, CB5, CB7) are rated at 15 amps.

START UP PROCEDURE:

1. With all wiring completed as described in the previous section and circuit breakers #1 - #8 "off", turn on main power via power feed breakers or Main disconnect. Observe that both power supplies (PS1 & PS2) have RED LED "on".
2. Turn CB #1 "on" and turn front panel Hydropurge #1 switch to "MAN" for approx. 2 seconds. The Hydropurge pump connected as Hydropurge #1 should run for the 2 second interval. Caution Do not run the Hydropurge motor for more than 2 seconds when

not fully submerged. Permanent motor and pump damage may occur if the motor is run without being submerged.

If pump runs while in "MAN" mode, proceed to next step. If pump does not run, recheck wiring on TB2, and ensure that pump motor runs when powered directly from power feed (bypass Multiwell Panel.)

3. With CB#1 "on", turn front panel Hydropurge #1 switch to "Auto" position. Slowly immerse probe connected to probe #1 (TB3U-6) in a bucket of water. When water reaches upper sense rod in probe (shortest 1/4 dia. rod, approx. 3 1/2" from top of probe), Green "Pump On" light should come on and Hydropurge pump #1 should run. Again, observe caution about running motor when not fully submerged. Slowly raise probe out of water. Motor and green "pump on" light should remain on until water level falls below lower sense rod in probe (about 7 1/2" from top of probe). Pump motor and green light should be off at this point.
If all is o.k., proceed to next step. If not all o.k., check wiring of probe to TB3, check to ensure Logic Card LC1 is fully and properly plugged in.

4. Using CB#3, Logic Card LC2, probe #2 connected to TB3 (7-12), repeat steps 2 & 3 for checkout of Hydropurge #2.

5. Using CB#5, Logic Card LC3, Probe #3 connected to TB5 (1-6), repeat steps 2 & 3 for checkout of Hydropurge #3.

6. Using CB#7, Logic Card LC4, Probe #4 connected to TB5 (7-12), repeat

steps 2 & 3 for checkout of Hydropurge #4.

7. With CB#2 "on", turn front panel Petropurge 1 switch to "MAN" position for approx. 2 seconds. Petropurge pump 1 should run for the 2 second interval. Observe the same caution with the Petropurge pump being unsubmerged as with the Hydropurge pumps previously discussed.

   If pump runs while in "MAN" mode, proceed to next step. If pump does not run, recheck pump wiring on TB2 and ensure that pump motor runs when powered directly from power feed (bypass Multiwell panel).

8. With CB#2 on, turn front panel Petropurge switch to "auto" position (probe #1 should be out of water and in upright position). Hydropurge #1 switch should be in "auto" position. CB#1 should be "OFF". Invert probe (turn upside down). Green Petropurge "pump on" light should begin to blink. After 30 - 40 seconds, green Petropurge "pump on" light should be on steady and pump motor should run. Observe caution regarding running pump unsubmerged.

   Turn probe right side up. Petropurge pump motor should stop and green "pump on" light should go out.

   Slowly immerse probe in a bucket of water. When water reaches lower sense post (approx. 7 1/2" from top of probe). The red "wat shutdown" light should come on dimly. When water reaches the intermediate sense post (approximately 4 1/2" from top of probe) the "water shutdown" light should come on brightly.

MULTIWELL INSTALLATION

When water reaches upper sense post (approx 3 1/2 inches from top of probe), green Hydropurge "pump on" light should come on and red water shutdown light should remain bright.

Completely immerse probe in water. Petropurge should not turn on, Hydropurge "pump on" light should be on and "water shutdown" light should be on. Remove probe from water; all lights should be out.

If all checks o.k., proceed to next step. If not o.k., check probe wiring at TB3, check to ensure Logic Card LC1 is fully and properly plugged in.

9. Using CB#4, Logic Card LC2 and probe #2 connected to TB3 (7-12) repeat steps 7 & 8 for Petropurge #2 checkout. (CB3 should be "OFF")
10. Using CB#6, Logic Card LC3 and probe #3 connected to TB5 (1-6) repeat steps 7 & 8 for Petropurge #3 checkout. (CB5 should be "OFF")
11. Using CB#8, Logic Card LC4 and probe #4 connected to TB5 (7-12) repeat steps 7 & 8 for Petropurge #4 checkout. (CB7 should be "OFF".)
12. If one or more tankfull probes are to be used, check out as follows: Invert probe or manually raise either float. Yellow "Tankfull" light should come on. In cases where pins TB7-2-5s are jumpered to permit a single recovery tank, all four yellow "Tankfull" lights should come on. If you manually raised one float, repeat test by raising the other float.

13. To check condition of Fuses F1 & F2 observe the red LED lights on the power supply printed circuit boards PS1 and PS2. If these lights are illuminated when the power is on (there is current at L1 and L2 of terminal block TB1) then the fuses are o.k.

14. The above procedures and nomenclature are for a Model 44 Multiwell. Other model Multiwells may not have all components discussed above.

On Model 22 Units, CB5, CB6, CB7, CB8, K9, K10, K11, K12, K13, K14, K15, K16, LC3, LC4 & TB5 do not exist.

This completes the initial start up and check out procedure for the Multiwell. You are now ready to install the pumps and probe in the recovery well in accordance with normal Petropurge and Hydropurge procedures and recommendations.

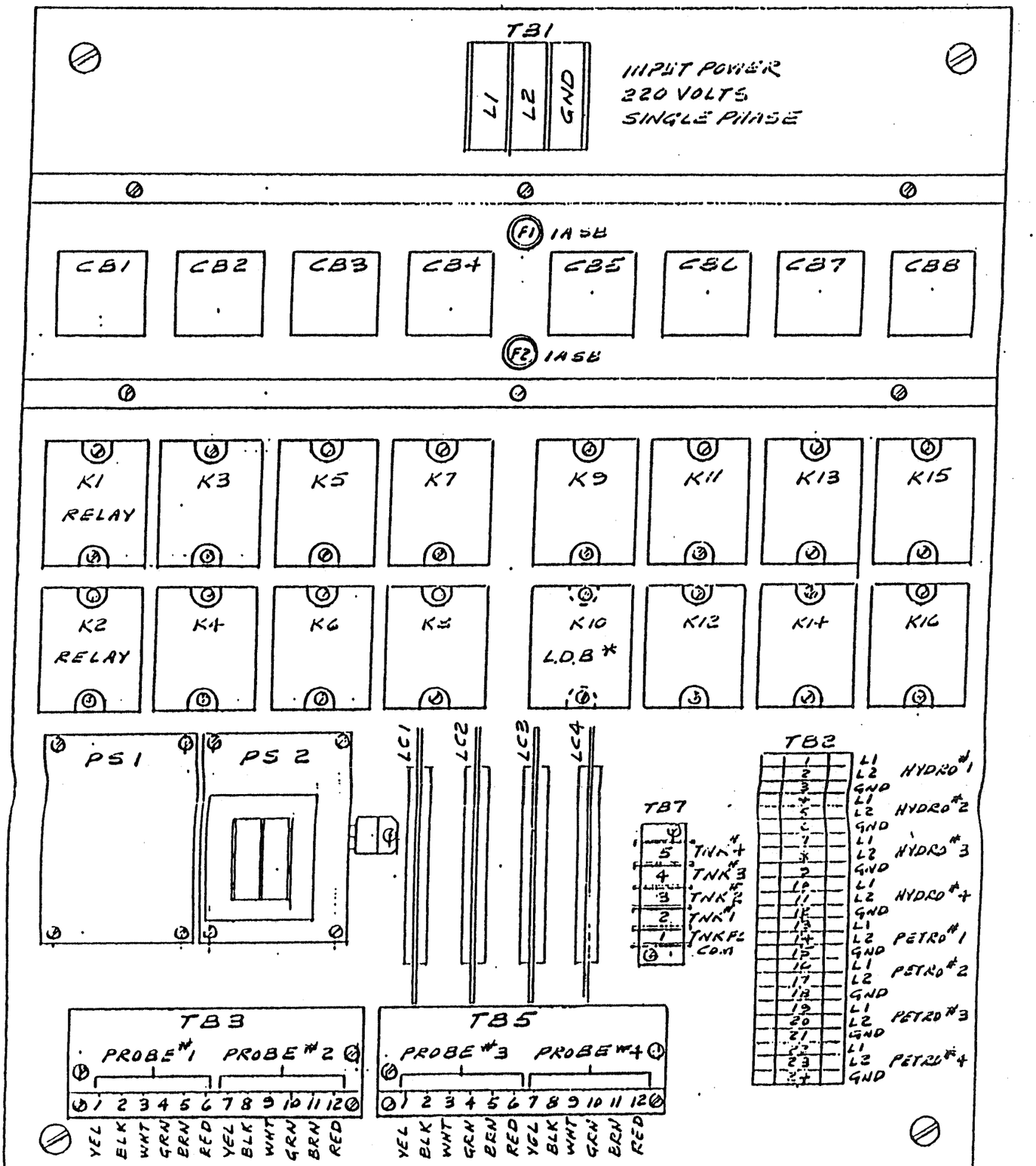
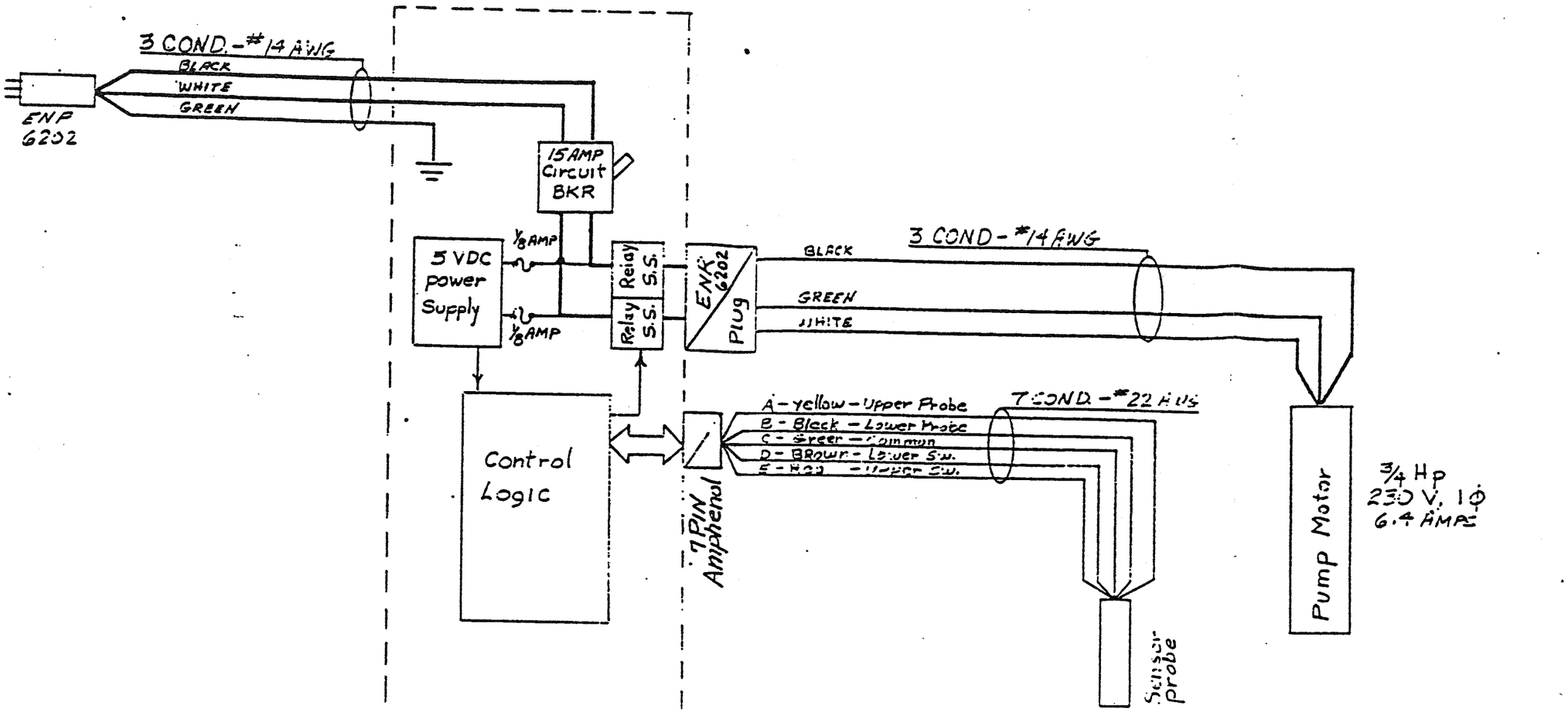
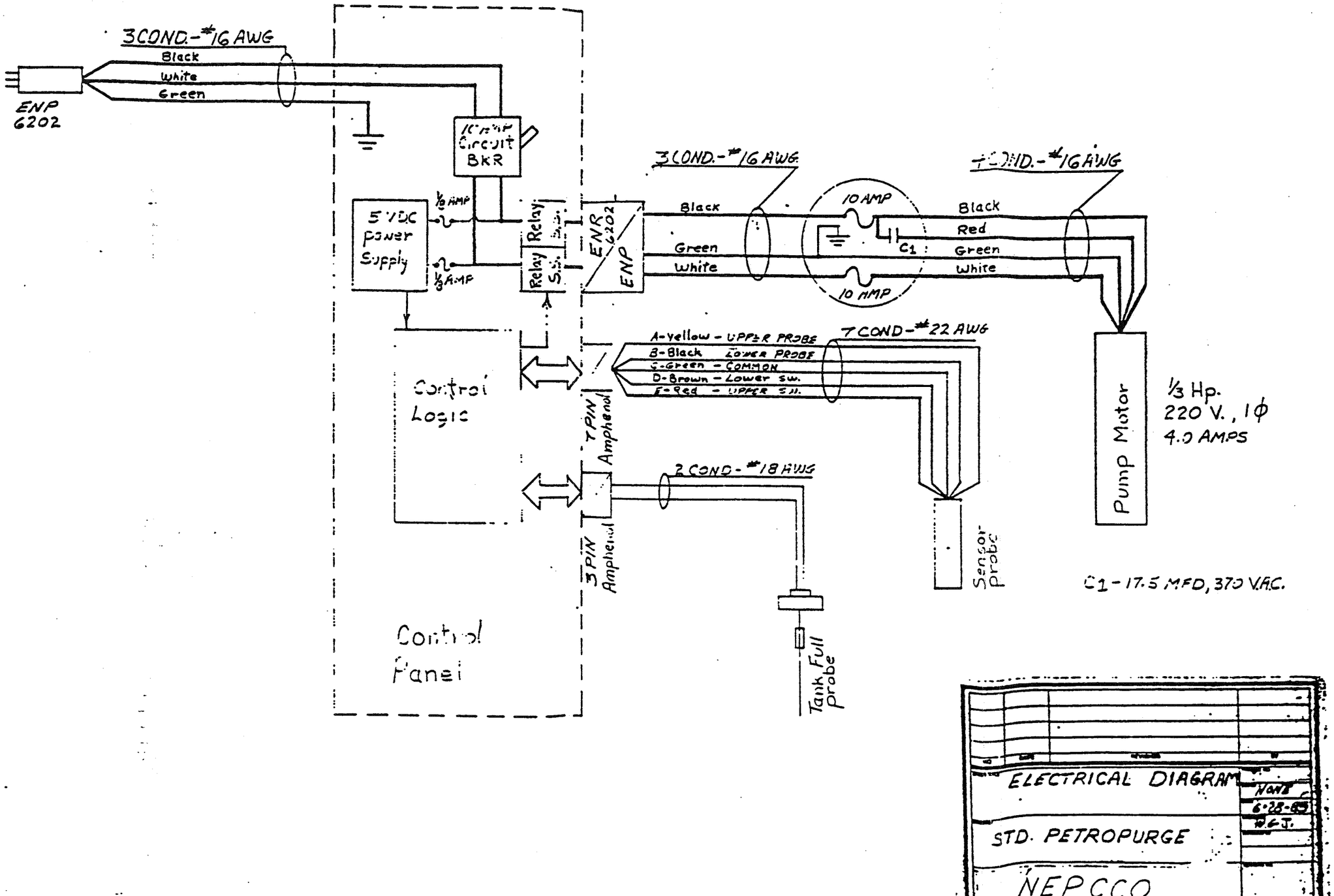


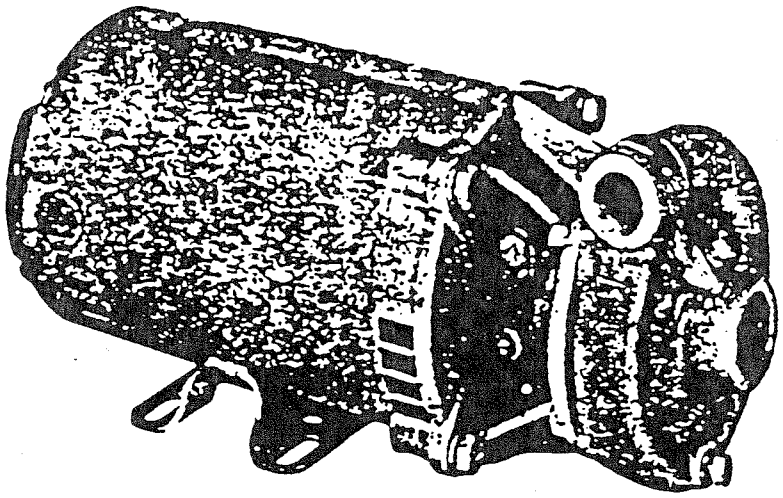
FIGURE 1

* LAMP DRIVER BOARD (L.D.B.) MOUNTED ABOVE RELAY K10



	ELECTRICAL DIAGRAM	NONE
		6-28-85
	STD. HYDROPURGE	M.G.J.
	3/4 & 1 HORSEPOWER	
	NEPCCO	


3 COND.-#16 AWG
Black
White
Green
ENP 6202
10 AMP Circuit BKR
5 VDC power Supply
1/8 AMP
1/8 AMP
Relay S.S.
Relay S.S.
ENR 6202 ENP
3 COND.-#16 AWG
Black
Green
White
10 AMP
10 AMP
C1
7 COND.-#16 AWG
Black
Red
Green
White
A-Yellow - UPPER PROBE
B-Black LOWER PROBE
C-Green - COMMON
D-Brown - Lower s.w.
E-Red - UPPER S.W.
7 COND-#22 AWG
7 PIN Amphenol
3 PIN Amphenol
2 COND-#18 AWG
Control Logic
Control Panel
Sensor Probe
Tank Full probe
Pump Motor
1/3 Hp.
220 V., 1φ
4.0 AMPS
C1 - 17.5 MFD, 370 V.A.C.
ELECTRICAL DIAGRAM
NONE
6-28-65
W.C.J.
STD. PETROPURGE
NEPCCO



SERIES 30

1" x 3/4" CENTRIFUGAL PUMP

SERIES 30 centrifugal pumps are close-coupled to standard NEMA "C" face motors. Open adaptor protects motor. All models are available in cast iron, bronze or aluminum construction to suit a wide variety of liquids.

All fasteners are stainless steel to reduce corrosion. Impellers are balanced to improve efficiency and bearing life.

Standard stainless steel and Viton mechanical seal is self-adjusting and corrosion resistant to handle almost any liquid.

Completely tested pump "wet ends" are available with or without motors and can be mounted to standard "C" frame motors in just minutes.

Close-Coupled to Electric Motor

or

Pumpak Only to Mount to Standard NEMA "C" Face Motor

1/3 - 1/2 - 3/4 - 1 HP

UP TO 70 GPM

UP TO 45 FT. HEAD

Available in:

BRONZE - ALUMINUM - CAST IRON

- VERTICAL OR HORIZONTAL DISCHARGE
- WITH OR WITHOUT ELECTRIC MOTOR

PUMP SPECIFICATIONS

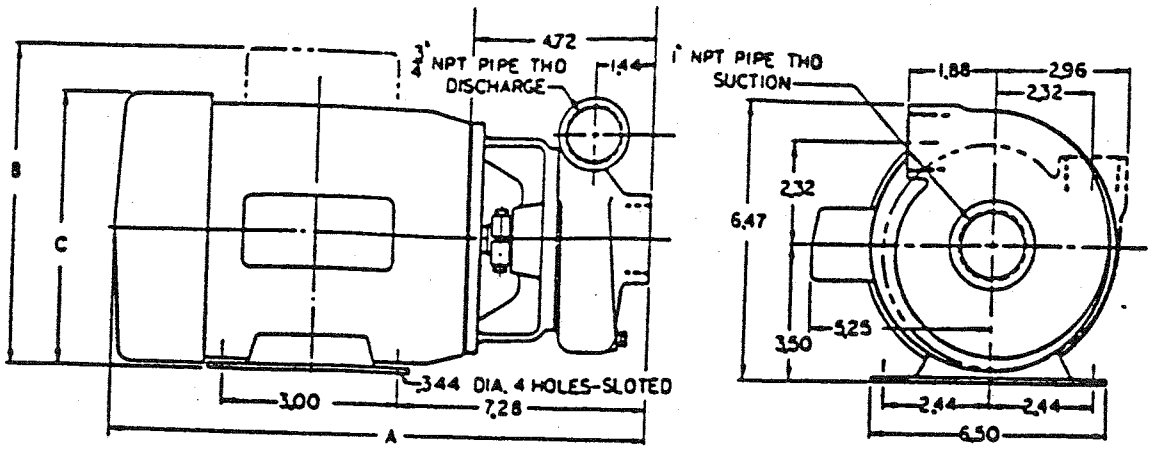
Suction & Discharge	1" x ¾"
Housing	Cast iron, bronze or aluminum with vertical or horizontal discharge
Impeller	Bronze, aluminum or cast iron — semi-opened
Shaft Sleeve	Stainless steel with ⅝" bore to fit 56C frame
Fasteners	All Stainless Steel
Seals	Standard VITON. Special seal material available. (Consult factory).

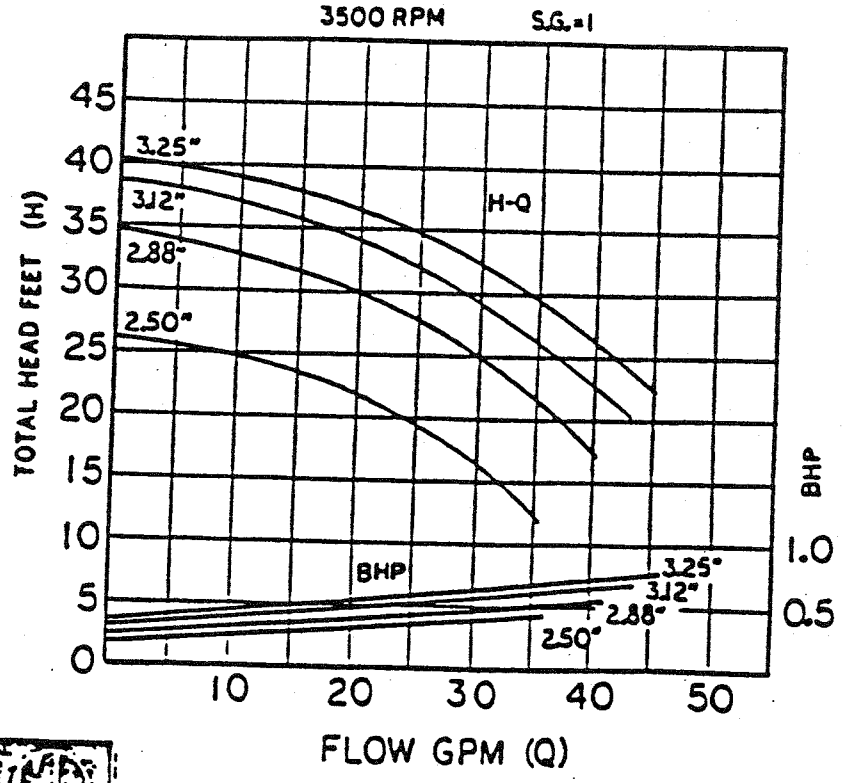
DIVISION OF TECUMSEH PRODUCTS COMPANY

816 LYCASTE • DETROIT, MICHIGAN 48214 • (313) 822-0240

CENTRIFUGAL PUMP
ELECTRIC MOTOR DRIVE

FRAME	H.P.	PH	ENCL.	A	B	C
56C	1/3	1	OOP	13.72	9.12	6.88
56C	1/3	3	OOP	13.72		6.88
56C	1/3	1	TEFC	14.97	9.12	7.16
56C	1/3	3	TEFC	14.97		7.16
56C	1/2	1	OOP	13.72	9.12	6.88
56C	1/2	3	OOP	13.72		6.88
56C	1/2	1	TEFC	14.97	9.12	7.16
56C	1/2	3	TEFC	14.97		7.16
56C	3/4	1	OOP	13.72	9.12	6.88
56C	3/4	3	OOP	13.72		6.88
56C	3/4	1	TEFC	14.97	9.12	7.16
56C	3/4	3	TEFC	14.97		7.16
56C	1	1	TEFC	14.97	9.12	7.16
56C	1	3	OOP	13.72		6.88
56C	1 1/2	3	OOP	13.72		6.88
56C	1 1/2	3	TEFC	14.97		7.16





DIVISION OF TECUMSEH PRODUCTS COMPANY

516 LYCASTE • DETROIT, MICHIGAN 48214 • (313) 822-0340

INSTRUCTION BULLETIN

MP STRAIGHT CENTRIFUGAL PUMPAKS
MODELS: 30, 60, 80, 110, 130, 200

READ THIS BULLETIN CAREFULLY BEFORE INSTALLING OR OPERATING THE PUMPAK

It is important that this instruction bulletin be read over carefully to fully familiarize yourself with the PUMPAK assembly arrangement. The instructions contained in this bulletin pertain to the installation and maintenance of the PUMPAK assembly only.

Check the PUMPAK over carefully to make certain that no parts are missing or broken in shipment. CAUTION: Do not disturb the assembly shim at the suction opening of the pump housing until after the PUMPAK has been completely assembled to the driver.

Packed separately with each unit are instruction bulletin, parts list, and literature describing this PUMPAK.

CONSTRUCTION:

The PUMPAK consists of a housing, adaptor, stainless steel shaft sleeve, shaft seal, seal spring keeper, impeller, drive clamp, gaskets, Woodruff key, impeller locknut, and stainless steel fasteners. Series 80 does not use the seal spring keeper.

The impeller is slipped onto the shaft sleeve and is driven by a Woodruff key and locked in place by a self-locking nut. The Series 80 has the impeller screwed onto the shaft sleeve and held in place by a self-locking nut. The shaft sleeve is machined to precisely fit the shaft on your driver. No provision is made for an internal drive key and none is required. The drive clamp assembly takes the place of internal drive keys, securely locks the shaft sleeve to the driver shaft, and serves additionally as a liquid slinger to protect your motor or engine.

The mechanical seal is the self-adjusting, greaseless type, being lubricated by the liquid in the pump. It requires no maintenance and provides long and trouble-free operation. Because the seal is lubricated by the liquid in the pump, the pump should never be operated without liquid in the housing.

In freezing weather, the pump should always be drained liquid unless sufficient anti-freeze solution is in the systen

MOUNTING PUMPAK TO DRIVER:

ROTATION:

Check rotation of driver to be sure it coincides with th required rotation of the PUMPAK assembly. When viewe from the driver end PUMPAK rotation may be Rigl Hand (Clockwise), Left Hand (Counter-clockwise) Reversible. If discharge port is to your right, pump Right Hand Rotation. To the left, Left Hand Rotation. pointing upward, and in center of housing, PUMPAK ma be operated in either direction.

Loosen the drive clamp fasteners but do not remov NOTE: If the driver shaft is a keyed shaft, remove the ke before installing the MP PUMPAK. The drive clam assembly on the MP PUMPAK is all that is required drive the pump. Slide PUMPAK assembly onto the drive shaft, aligning capscrew or stud holes in adaptor with th tapped holes in the driver mounting face, until adapt contacts the mounting face.

Install fasteners and tighten to secure PUMPAK assembl to driver. First center, then tighten drive clamp assemb to lock shaft sleeve onto driver shaft.

After all fasteners are tight, including drive clamp a sembly, remove the strip stock shim from the suction eye the pump housing. This shim was inserted to establis clearance between the face of the impeller and pum housing. Rotate driver slowly by hand to make certain th impeller does not rub or hit the housing or adaptor.

If impeller is rubbing, this means the shim was displace during shipment or handling.

A-115

OTATION: (Cont.)

To adjust impeller clearance, do this:

1. Loosen the impeller drive sleeve clamp.

2. Move impeller either forward or back by using a screwdriver to push impeller back — or move impeller drive sleeve forward.

   Depending on the seal spring tension, you can do this by hand without removing the pump housing. Turn the driver to determine that you have adjusted the clearance so the impeller does not rub. Then tighten the impeller drive sleeve clamp.

F THE SEAL SPRING TENSION PREVENTS THIS
IETHOD OF ADJUSTMENT, DO THIS:

1. Remove pump housing.

2. Loosen drive clamp, but do not remove.

3. Remove gaskets from housing.

4. Replace housing, pushing against impeller face. Secure housing with two fasteners, 180° apart.

5. Securely tighten drive clamp.

6. Remove housing and install one gasket.

7. Replace housing, securing with two fasteners, 180° apart.

8. Rotate driver to determine if impeller rubs. If it does, add one more gasket. If not, replace all housing fasteners and tighten.

INSTALLATION:

The MP straight centrifugal PUMPAKS should be installed with flooded suction or as near to the liquid source as possible.

If it is necessary to install the pump above the level of the liquid, a priming line should be connected directly to the suction line. A check valve must be used in conjunction with a priming line or the priming liquid will merely pass through the suction line to the liquid source. The priming of the suction line evacuates the air in the suction line and pump. This series of pumps will not handle air and therefore all air must be displaced from the suction line and pump before the pump can operate. Be sure that pump housing is filled with liquid before starting the pump. THE MECHANICAL SEAL IN THE PUMP MUST NOT BE OPERATED DRY.

Pipe or hose of the same size (or larger) as inlet and outlet openings should be used on the installation. When using pipe, avoid sharp bends and use long radius elbows wherever possible. This will keep friction loss at a minimum and allow the pump to operate more effectively. Use pipe dope on all connections and be sure all fittings are air-tight, especially on the suction side of the pump. An air leak on the suction side of the pump will prevent proper operation. A section of non-collapsible hose between piping and pump may be used as a vibration dampener.

TO DISASSEMBLE THE PUMP:

Drain the system of liquid, break suction and discharge pipe unions, and, if necessary, remove all piping from the suction and discharge openings. Remove the fasteners holding the pump adaptor to the driver, loosen the drive clamp assembly, and remove the PUMPAK.

To disassemble, remove the fasteners holding the pump housing to the adaptor. Remove the housing but use caution so as not to tear the housing gaskets.

Remove the drive clamp assembly. The impeller, drive sleeve, seal bellows, and spring assembly will now slide forward free of the pump adaptor.

The seal seat and seat cup will remain in the pump adaptor. If not damaged or worn, do not remove. If necessary, remove from the adaptor counter bore with a piece of wood or a screwdriver handle inserted through the adaptor from the drive end. A sharp tap or two is usually sufficient to knock out the seal seat. Use caution in removing the seal seat so as not to crack a ceramic seat or distort a metal seat.

TO REMOVE IMPELLER:

Remove seal bellows and spring assembly. On some models, spring keeper can also be removed now before removing impeller.

NOTE: The seal bellows will be bonded to the shaft sleeve and will require some patience and caution in removal in order not to damage the seal bellows and cage.

Remove the impeller locknut from the end of the shaft sleeve. Slide the impeller from the shaft sleeve and remove the impeller Woodruff key. Series 80: Unscrew the impeller from the shaft sleeve counter-clockwise from impeller end.

INSPECTION:

Check all parts for wear. For ease of reassembly shaft sleeve should have all nicks and burrs removed. Clean with light crocus cloth. Replace damaged parts with new parts.

Inspect the seal seat and washer, seat cup, and seal bellows for grooves, cuts, scuff marks, or other deterioration. If any of the parts are damaged, a complete new assembly should be installed.

REASSEMBLY:

Clean all castings with mild cleaning solvent such as kerosene. All dirt and foreign matter should be removed. If seal is to be reused, use soft clean cloth to wipe seal faces.

Lubricate seal seat cup with liquid soap or clean grease and press seal seat into adaptor counter bore, seating it firmly and squarely. Use caution so as not to mar the lapped face of the seal seat.

Assemble shaft sleeve, seal spring keeper, impeller Woodruff key, impeller, and impeller locknut. Before installing seal bellows and spring assembly, lubricate the shaft sleeve and rubber bellows with liquid soap or clean grease and press bellows and spring assembly onto the shaft sleeve. The spring should engage the spring keeper at the impeller end of the shaft sleeve. Be sure seal washer is properly positioned before and during the assembly operation.

To be properly positioned the washer must be firmly against the rubber bellows member and the driving lugs of the washer properly engaged. The raised shoulder on the seal washer should be facing away from the impeller to contact the lapped surface of the seal seat in the adaptor.

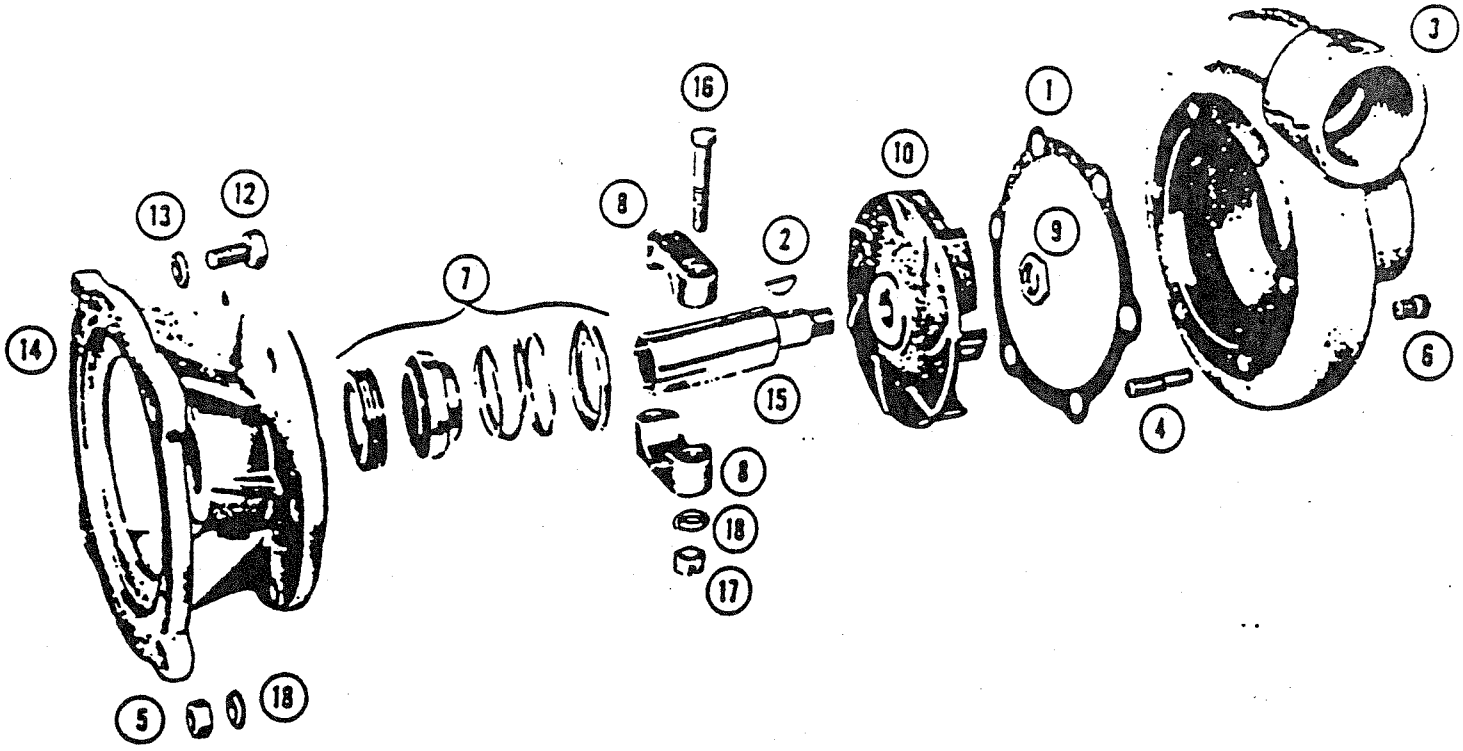
Slide impeller and seal assembly into the adaptor. Install drive clamp assembly on shaft sleeve but do not tighten.

Proceed with mounting instructions shown under MOUNTING PUMPAK TO DRIVER.

DRIVER REPAIRS:

1. Remove piping, install strip stock impeller shim.
2. Remove four capscrews which fasten adaptor to driver.
3. Loosen drive lamp assembly.
4. Remove PUMPAK.

After driver repairs, reinstall PUMPAK accoreding to instructions shown under MOUNTING PUMPAK TO DRIVER.



Parts shown are typical, not necessarily actual views.

Item No.	Description	Item No.	Description
1	Gasket	** 10	Impeller
* 2	Woodruff Key	* 11	Seal Spring Retainer
3	Housing	12	Capscrew
4	Stud	13	Lockwasher
5	Hex Nut	14	Adaptor
6	Plug	15	Shaft Sleeve
7	Seal Assembly	16	Capscrew
8	Drive Clamp	17	Hex Nut
9	Impeller Locknut	18	Lockwasher

* Not used on Series 80

** Impeller shown is Semi-open. Series 60 and 80 use enclosed impellers.

MP PUMPS DIVISION OF TECUMSEH PRODUCTS CO.
34800 Bennett Dr., Fraser, MI 48026 (313) 293-8240 TLX: 358-238

CLOSE COUPLED FOR ELECTRIC MOTOR DRIVE

with Mechanical Seal
1" x 3/4" Pipe Size

SERIES 30 STRAIGHT CENTRIFUGAL PUMPAKS

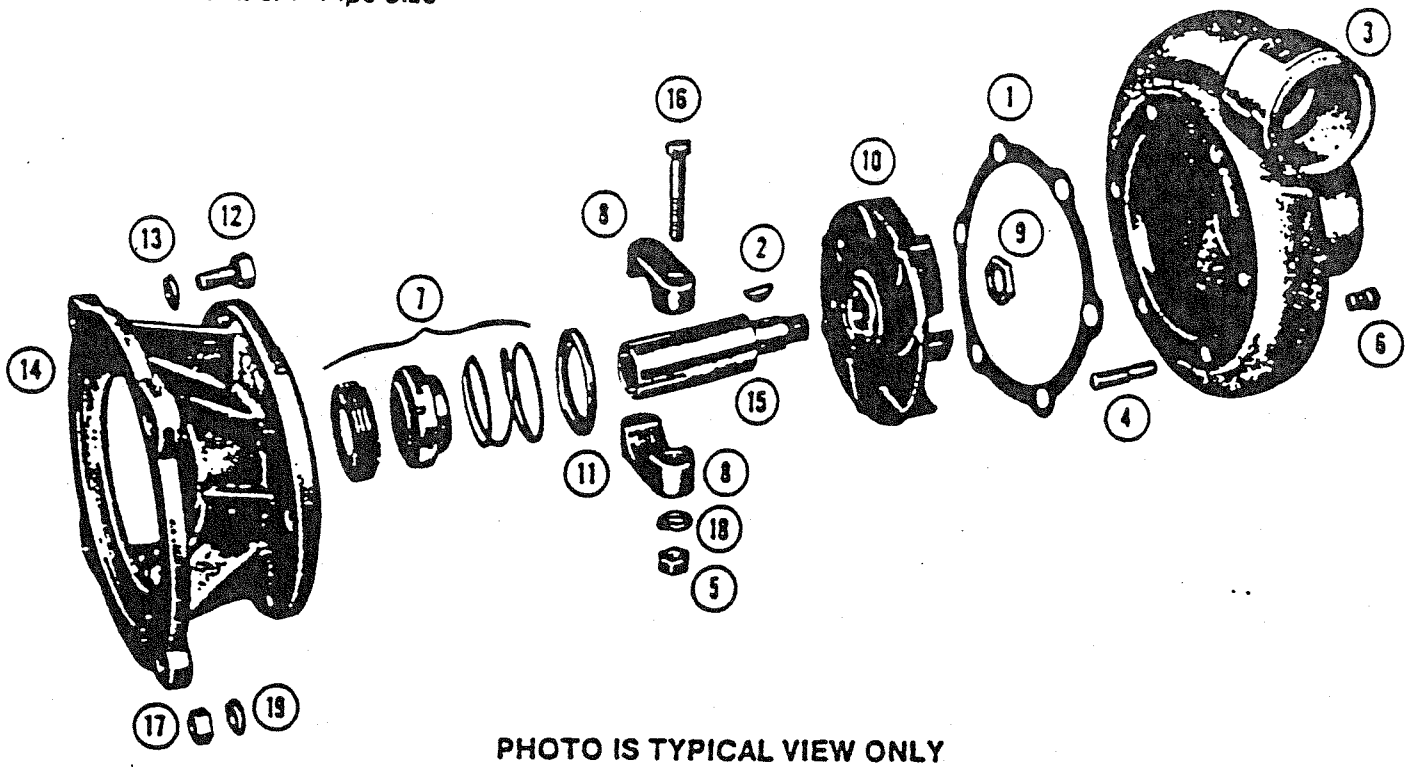


PHOTO IS TYPICAL VIEW ONLY

IMPORTANT: When ordering parts, specify model and serial number shown on nameplate.
N/S means "not shown" in exploded view of parts.

ITEM NO.	PART NO.	DESCRIPTION	QUANTITY REQUIRED PER MODEL		
		ROTATION	ALL MODELS LISTED ARE RIGHT HAND		
		PIPE SIZE	ALL MODELS LISTED ARE 1" x 3/4"		
		METAL	CAST IRON	ALUMINUM	BRONZE
		MODEL NO.	23221 23222 24319 22678	23219 24316 24317 24320	23220 23938 24318 24186
HOUSING					
	22915	Housing Assembly - Inc:	1		
3		Housing - Cast Iron	1		
4	21243	Stud - S.S. - 5/16"	4		
6	21255	Pipe Plug - S.S. - 1/8" NPT	2		
	23826	Housing Assembly - Inc:		1	
3		Housing - Aluminum		1	
4	21243	Stud - S.S. - 5/16"		4	
6	21255	Pipe Plug - S.S. - 1/8" NPT		1	
	22914	Housing Assembly - Inc:			1
3		Housing - Bronze			1
4	21150	Stud - Br. - 5/16"			4
6	21185	Pipe Plug - Bronze - 1/8" NPT			1

MP PUMPS
A DIVISION OF TECUMSEH PRODUCTS CO.
515 LYCASTE DETROIT, MICHIGAN 48214 · (313) 822-0240

SERVICE PARTS LIST
Form 7020-A

ITEM NO	PART NO	DESCRIPTION	QUANTITY REQUIRED PER MODEL		
		ROTATION	ALL MODELS LISTED ARE RIGHT HAND		
		PIPE SIZE	ALL MODELS LISTED ARE 1" x 3/4"		
		METAL	CAST IRON	ALUMINUM	BRONZE
		MODEL NO.	23221	23219	23220
			23222	24316	23938
			24319	24317	24318
			22678	24320	24186
HOUSING					
17	21244	Hex Nut - S.S. - 5/16"	4	4	
19	21238	Lockwasher - S.S. - 5/16"	4	4	
17	21179	Hex Nut - Br. - 5/16"			4
19	21184	Washer - Br. 5/8"			4
1	21126	Gasket	4	4	4
IMPELLER					
10	22573	Impeller C.I. - 3-1/4" dia. for Model 23221	1		
10	22571	Impeller - Alum. - 3-1/4" dia. for Model 23219		1	
10	22572	Impeller - Br. - 3-1/4" dia. for Model 23220			1
10	22138	Impeller - C.I. - 2-7/8" dia. for Model 23222	1		
10	24322	Impeller - Alum. - 2-7/8" dia. for Model 24316		1	
10	22137	Impeller - Br. - 2-7/8" dia. for Model 23938			1
10	22149	Impeller - C.I. - 3-1/8" dia. for Model 24319	1		
10	24324	Impeller - Alum. - 3-1/8" dia. for Model 24317		1	
10	22148	Impeller - Br. - 3-1/8" dia. for Model 24318			1
10	22143	Impeller - C.I. - 2-1/2" dia. for Model 22678	1		
10	24323	Impeller - Alum. - 2-1/2" dia. for Model 24320		1	
10	22142	Impeller - Br. 2-1/2" dia. for Model 24186			1
15	22131	Impeller Drive Sleeve 5/8"	1	1	1
9	22588	Lock Nut - S.S. - 3/8"	1	1	1
2	21865	Impeller Drive Key	1	1	1
Clamp					
	23002	Clamp Assembly Inc.			
8		Clamp			
5	21284	Hex Nut - S.S. - 5/16"	2	2	2
18	21238	Lockwasher - S.S. - 5/16"	2	2	2
16	21264	Capscrew - S.S. - 5/16"	2	2	2
SEAL					
7	22272	Seal Assembly	1	1	1
11	22133	Seal Spring Retainer	1	1	1
ADAPTOR					
14	22130	Adaptor - Cast Iron	1		
14	22128	Adopter - Aluminum		1	
14	22129	Adaptor - Bronze			1
12	21251	Capscrew - S.S. - 3/8"	4	4	4
13	21266	Lockwasher - S.S. - 3/8"	4	4	4

TECUMSEH PRODUCTS COMPANY'S LIMITED WARRANTY FOR NEW PUMPS MANUFACTURED BY MP PUMPS

A. PRODUCTS WARRANTED

MP Pumps Division of Tecumseh Products Company ("Tecumseh"), subject to the limitations contained below, will at its option, repair or replace, without charge for parts or labor only, any part or parts of a new pump manufactured by MP PUMPS ("MP PUMPS") which is found, upon examination by Tecumseh's MP PUMPS factory in Fraser, Michigan, to be DEFECTIVE IN MATERIAL AND/OR WORKMANSHIP if received by such factory for such examination within six months from the date of sale to the original consumer purchaser.

B. PRODUCTS AND ITEMS NOT WARRANTED

1. Alterations or Modifications of MP PUMP

   All obligations under this warranty shall be terminated if the new MP PUMP is altered or modified in any way.

2. Accidents, Normal Maintenance, Failure To Follow MP PUMP Instruction Bulletin

This warranty covers only parts of a new MP PUMP which are found upon examination to be defective in material or workmanship as delivered to the original consumer purchaser. This warranty does not cover defects caused by depreciation or damage caused by normal wear, accidents, improper maintenance, improper use or abuse of the product, failure to follow the instructions contained in an Instruction Bulletin for the operation of the pump and parts. The cost of normal maintenance and replacement of service items which are not defective, shall be paid for by the original consumer purchaser.

C. SECURING WARRANTY SERVICE

Warranty service can be arranged by contracting the MP PUMPS Division of Tecumseh, c/o Service Manager, 34800 Bennett Dr., Fraser, Michigan 48026. Warranty service can only be performed by the MP PUMPS Division of Tecumseh at its factory in Fraser, Michigan. At the time of requesting warranty service, evidence must be presented of the date of sale to the original consumer purchaser. The purchaser shall pay any charges for making service calls and/or for transporting the product to and from the place where the inspection and/or warranty work is performed. The purchaser shall be responsible for any damage or loss incurred in connection with the transportation of the MP PUMP and/or of part or parts of the MP PUMP submitted for inspection and/or warranty work.

D. NO ADDITIONAL WARRANTIES OR REPRESENTATIONS

The foregoing EXPRESSED WARRANTY IS IN LIEU OF ALL OTHER EXPRESSED WARRANTIES. Neither Tecumseh nor any of its affiliates make any warranties, representations or promises, written or verbal, as to the quality of the MP PUMP or its parts other than those set forth herein.

ANY IMPLIED WARRANTIES (INCLUDING, BUT NOT LIMITED TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) TO THE EXTENT EITHER APPLIES TO PART OR PARTS OF A MP PUMP SHALL BE LIMITED IN DURATION TO THE PERIODS OF THE EXPRESSED WARRANTIES AS DEFINED IN PARAGRAPH A. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply.

E. DAMAGES

IN NO EVENT WILL TECUMSEH BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES AND/OR EXPENSES. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. This warranty gives you specific legal rights and you may have other legal rights which vary from state to state.

F. NO DISTRIBUTOR DEALER WARRANTY

Tecumseh neither assumes nor authorizes any other person, natural or corporate, to assume for Tecumseh any other obligations or liabilities in connection with or with respect to any part or parts of a MP PUMP. The seller, dealer or distributor of part or parts of a MP PUMP has no authority to make any representations or promises on behalf of Tecumseh or to modify the terms or limitations of this warranty in any way. The seller, dealer or distributor makes no warranty of his own on any item warranted by Tecumseh and makes no warranty on other items, unless such seller or dealer delivers to the purchaser a separate written warranty document in which the seller or the dealer individually and specifically on its own behalf, warrants the terms or items.

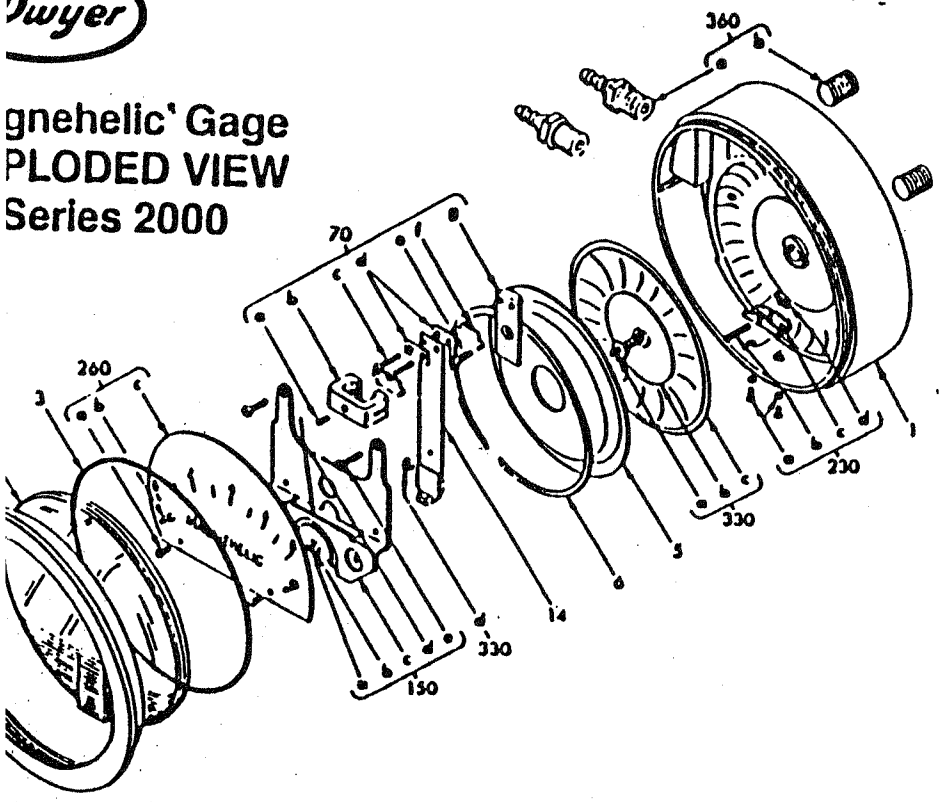
MP PUMPS DIVISION OF TECUMSEH PRODUCTS CO.
34800 Bennett Dr., Fraser, MI 48026 (313) 293-8240 TLX: 358-238

LITHO IN U.S.A.

FORM NO. 985DC

Dwyer

gnehelic® Gage
PLODED VIEW
Series 2000



1. Case
2. Cover with zero adjust assy
3. 'O' ring seal
4. Bezel
5. Diaphragm sealing plate
6. Retaining ring
10. Range Spring assembly
    a. Clamp set screw
    b. Clamp
    c. Mounting screws (2 req'd)
    d. Clamping shoe (2 req'd)
    e. Clamp plate screw
    f. Spacer (2 req'd)
    g. Clamp plate
14. Range Spring with magnet
30. Wishbone Assembly – consists of:
    a. Front jewel
    b. Locking nut
    c. Wishbone
    d. Pointer
    e. Mounting screws (2 req'd)
    f. Helix assembly (not shown)
    g. Pivots (2 req'd) (not shown)
    h. Rear jewel (not shown)
230. Zero adjust assembly – consists of:
    a. Foot screws with washers (2 req'd)
    b. Adjust screw
    c. Foot
    d. Finger
260. Scale Assembly – consists of:
    a. Mounting screws (2 req'd)
    b. Bumper pointer stop (2 req'd)
    c. Scale
330. Diaphragm Assembly – consists of:
    (Arbor press needed to install)
    a. Linkage assy., complete
    b. Front plate
    c. Diaphragm
    d. Rear plate (not shown)
    e. Plate washer (not shown)
360. Mounting Hardware Kit
    a. Adapter – pipe plug ⅛" NPT to rubber tubing – (2 req'd)
    b. Pipe plug ⅛" NPT – (2 req'd)
    c. Mounting lug (3 req'd)
    d. Long screw (3 req'd)
    e. Short screw (3 req'd)

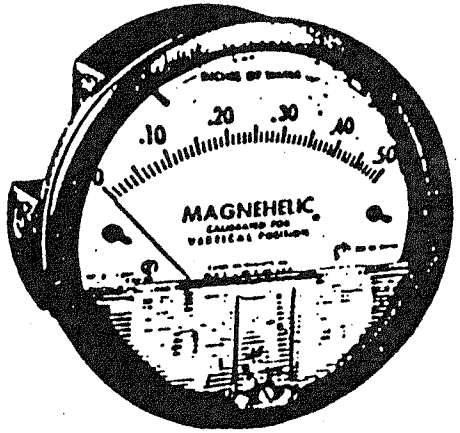
Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, refer to the call-out numbers in this view. Be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service information.

OPERATING INSTRUCTIONS and PARTS LIST

Dwyer

Magnehelic® Differential Pressure Gage



SPECIFICATIONS

Dimensions: 4-3/4" dia. X 2-1/16" deep

Weight: 1 lb 2 oz

Finish: Baked dark gray enamel

Connections: 1/8 N.P.T. high and low pressure taps, duplicated, one pair side and one pair back.

Accuracy: Plus or minus 2% of full scale, at 70° F (Model 2000-0, 3%; 2000-00, 4%)

Pressure Rating: 15 PSI

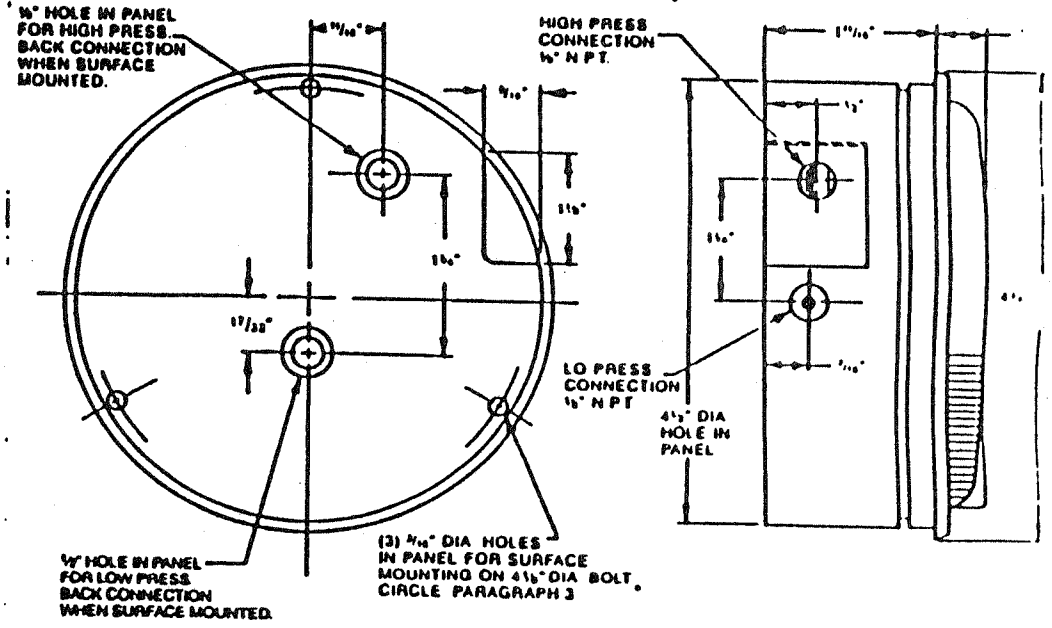
Ambient Temperature Range: 20° to 140° F

Standard gage accessories include two 1/8" N.P.T. plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Hydrogen Gas Precautionary Note: The rectangular rare earth magnet used in the standard gage may not be suitable for use with hydrogen gas since a toxic and explosive gas may form. For hydrogen service, consult the factory for an alternate gage construction.



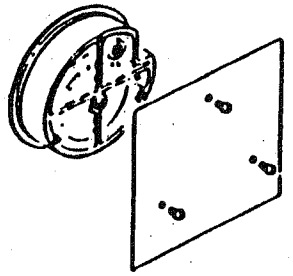
DWYER INSTRUMENTS, INC.
Telephone 219/872-9141

MA[illegible]HE[illegible]IN[illegible]ALL[illegible]ON

Select a location free from excessive oration and where the ambient temperature ll not exceed 140°F. Also, avoid direct nlight which accelerates discoloration of : clear plastic cover Sensing lines may be n any necessary distance. Long tubing ngths will not affect accuracy but will rease response time slightly Do not restrict es If pulsating pressures or vibration cause cessive pointer oscillation, consult the fac- y for ways to provide additional damping.

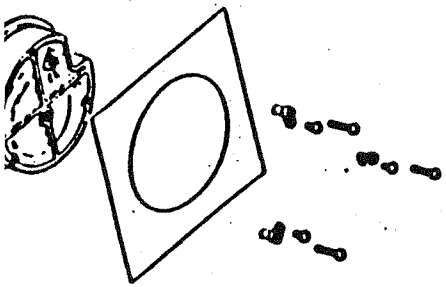
All standard Magnehelic gages are cali- ted with the diaphragm vertical and uld be used in that position for maximum uracy If gages are to be used in other than ical position, this should be specified on order Many higher range gages will per- n within tolerance in other positions with rezeroing. Low range Model 2000-0 metric equivalents must be used in the ical position only.

Surface Mounting



atic mounting holes, 120° apart on a 4-1/8" circle Use No. 6-32 machine screws of opriate length.

Flush Mounting



ide a 4⅛" dia. opening in panel. Invert and secure in place with No. 6-32 ine screws of appropriate length, with tors, Part No. 360c, firmly secured in :. To mount gage on 1¼"-2" pipe, order onal A-610 pipe mounting kit

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of gage is vented in a dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

a. For portable use or temporary installation, use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

b. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

MA[illegible]EN[illegible]E

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

1. With gage case, P/N 1, held firmly, loosen bezel, P/N 4 by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp, P/N. 70-b. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Place cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw, P/N 230-b.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument. Make further adjustments as necessary.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum sulphate compound

Warning: Attempted field repair may void your warranty. Recalibration or repair by the user is not recommended. For best results return gage to the factory

Trouble Shooting Tips:

• *Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O" ring damaged, missing.
5. Pressure sensors, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F order gage with low temperature, (LT) option

• *Pointer stuck-gage can't be zeroed*

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. Metallic particles clinging to magnet and interfering with helix movement
4. Cover zero adjust shaft broken or not properly engaged in P/N 230-b adjusting screw.

We generally recommend that gages needing repair be returned to the factory Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation or failure. Gages repaired at the factory are carefully calibrated and tested to assure "like-new" operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only

AMERICAN FAN COMPANY

2933 Symmes Rd., Fairfield, Ohio 45014 Phone 513/874-2440 FAX 513/874-4096

PACKING LIST

JOB NO. 42305-N-DA DI[A]

Customer No. 14063
Date Entered 10/23/87
Cust. Order MA-2303
Cust. Job No.
Buyer PAUL GUERRA
Phone No. 617/543-8458
Ship Via ROADWAY-INV. SOLD T
Prepay & Add Yes
Collect
Conf. Order Attached To Follow Yes
Ship. Date Reqd. ASAP 11/6/87
Representative
Commission
Representative
Commission

Sold to NEPCCO
Street 29 WALL ST.
City FOXBORO MA 02035

Ship to SAVE INC.
C/O-MOBIL OIL CORP.
2423 LIND AVE., S.W.
RENTON, WASHINGTON 98055

MARK: FOR: MWAC03-19-87-WA

QUANTITY	MODEL NO.	B/M #	ROTATION	DISCHARGE	CLASS	LIST	DISC. MULT.	NET EACH	TOTAL
1.	AF-10	03-009	CW	TH					

MOTOR #	VENDOR	HP	RPM	PHASE	HERTZ	VOLTAGE
B-1-1/2		1-1/2	3600.	1	60	115/230

CUST. MTR.	A.F. MTR.	ENCL.	FRAME	ARRANGEMENT	WITH MOTOR	LESS MOTOR
	YES	TEFC	56-C	4	XX	

V-BELT DRIVE INFO.	GROOVES	BELT SIZE	MOTOR SHEAVE	BORE	MOTOR NET
NOT REQD.					
XXXXXXXXX					
XXXXXXXXX	DRIVE PACKAGE #		FAN SHEAVE	BORE	DRIVE PACKAGE

CFM	S.P.	O.V.	RPM	BHP	TEMP.	ELE.	DEN.	OTHER

WHEEL INFORMATION			LIST	DISC. MULT.	EACH	
BORE	PART NO.	MATERIAL				
5/8	23515-5/8 1044	ALUM				

PARTS, ACCESSORIES, SPECIAL INSTRUCTIONS, ETC.

ITEM	QUAN.	PART NO.	DESCRIPTION
A	0.		INLET SCREEN
B	0.		HAL CUT-OFF ON INLET
C	0.		ALUM BASE
			TOTAL PRICE

(For Office Use Only)

CREDIT REPORT

SIC NO TYPE

D & B

APPENDIX C

Drawings for Current Ground Water Extraction and Treatment System

Plans for:
Ground Water Remediation System

ExxonMobil Refining and Supply Company

Former Mobil Terminal
2423 Lind Avenue SW, Renton, Washington

Project Description

Petroleum recovery system installed in 1987. Re-designed and modified as a total fluids extraction system in 2002.

Prepared by:
Acton • Mickelson • Environmental, Inc.
Consulting Scientists, Engineers, and Geologists
5175 Hillsdale Circle #100
El Dorado Hills, California 95762
Phone (916) 939–7550
Fax (916) 939–7570
Project No. 13042.05

DRAWING LIST				
SECTION	**SHEET NUMBER**	**DRAWING NUMBER**	**DRAWING TITLE**	**REVISION**
GENERAL	1	RN-A-I-001	DRAWING INDEX	2
	2	RN-A-I-002	STANDARD ABBREVIATIONS	10/03
	3	RN-A-I-003	SYMBOLS LEGEND	3/01
PROCESS	4	RN-A-F-030	MECHANICAL FLOW DIAGRAM (1 OF 2)	1
	5	RN-A-F-031	MECHANICAL FLOW DIAGRAM (2 OF 2)	2
SITE	6	RN-A-P-020	SITE MAP WITH REMEDIATION AND MONITORING WELL LOCATIONS	1
	7	RN-A-P-021	TREATMENT EQUIPMENT PLOT PLAN	1
MECHANICAL	8	RN-A-M-800		
	9	RN-A-M-801		
	10	RN-A-M-802		
ELECTRICAL	11	RN-A-E-010		
	12	RN-A-E-020	ELECTRICAL BLOCK AND TWO-LINE DISTRIBUTION DIAGRAM	1
	13	RN-A-E-500	CONTROL DIAGRAM	2

ExxonMobil Refining and Supply Company
Former Mobil Terminal
2423 Lind Avenue SW
Renton, Washington

Acton · Mickelson · Environmental, Inc.
Consulting Scientists, Engineers, and Geologists
El Dorado Hills, California

Date Created: 12/29/06
Drawn: DJS
Prepared: JCT
Reviewed:

GROUND WATER
REMEDIATION SYSTEM
DRAWING INDEX

Project No. 13042.05
Drawing No. RN–A–I–001
File Name 1304205–001

REVISION NUMBER	REVISION DATE
2	04/29/09

Sheet 1 of 13

A	A	ADSORBER
	A/G	ABOVEGROUND
	ABS	ACRYLONITRILE BUTADIENE STYRENE
	AC	ALTERNATING CURRENT, ASPHALT, ASPHALTIC CONCRETE
	ACFM	ACTUAL CUBIC FOOT PER MINUTE
	ACV	ANALYZER CONTROL VALVE
	AGG	AGGREGATE
	AI	ANALYZER INDICATOR
	AIC	ANALYZER INDICATING CONTROLLER
	AL	ALUMINUM
	API	AMERICAN PETROLEUM INSTITUTE
	APPROX	APPROXIMATELY
	AR	ANALYZER RECORDER
	ARC	ANALYZER RECORDER CONTROLLER
	ASH	ANALYZER SWITCH HIGH
	ASL	ANALYZER SWITCH LOW
	AST	ABOVEGROUND STORAGE TANK
	ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
	AT	ANALYZER TRANSMITTER
	AWS	AMERICAN WELDING SOCIETY
B	B	BLOWER
	BARB	HOSE BARB CONNECTION
	BHP	BRAKE HORSEPOWER
	BLDG	BUILDING
	BNG	BOLT, NUT, GASKET
	BOM	BILL OF MATERIALS
	BOP	BOTTOM OF PIPE
	BOS	BOTTOM OF STEEL
	BOT	BOTTOM
	BTU	BRITISH THERMAL UNIT
C	°C	DEGREE CELSIUS
	C	COLUMN
	CB	CATCH BASIN
	CC	CUBIC CENTIMETER
	CFM	CUBIC FEET PER MINUTE
	CFS	CUBIC FEET PER SECOND
	CI	CAST IRON
	CL	CENTERLINE, CLASS
	CLEAR	CLEARANCE
	CM	CENTIMETER
	CO	CLEAN OUT
	CONC	CONCRETE
	CONC RED	CONCENTRIC REDUCER
	CONT	CONTINUED
	CP	COMPRESSOR
	CPLG	COUPLING
	CPVC	CHLORINATED POLYVINYL CHLORIDE
	CS	CARBON STEEL
	CU FT	CUBIC FEET
	CU IN	CUBIC INCH
	CU YD	CUBIC YARD
	CV	CHECK VALVE
D	DB	DECIBEL
	DC	DIRECT CURRENT
	DEG	DEGREE(S)
	DI	DUCTILE IRON
	DIA	DIAMETER
	DIS	DISCHARGE
	DIST	DISTANCE, DISTRIBUTION
	DO	DISSOLVED OXYGEN
	DP	DIFFERENTIAL PRESSURE
	DPI	DIFFERENTIAL PRESSURE INDICATOR
	DPDT	DOUBLE POLE DOUBLE THROW
	DWG	DRAWING
E	E	EAST
	E-O-LET	ELBOW-O-LET
	EA	EACH
	ECC RED	ECCENTRIC REDUCER
	EJ	EXPANSION JOINT
	ELEV	ELEVATION
	EMT	ELECTRICAL METALLIC TUBING
	EQPT	EQUIPMENT
	EW, EX	EXTRACTION WELL
	EXIST	EXISTING
F	°F	DEGREE FAHRENHEIT
	F	FILTER, FLOW
	FBO	FURNISHED BY OTHERS
	FC	FLOW CONTROLLER
	FCV	FLOW CONTROL VALVE
	FDN	FOUNDATION
	FEM	FEMALE
	FF	FLAT FACE
	FG	FLOW GLASS
	FI	FLOW INDICATOR
	FIC	FLOW INDICATING CONTROLLER
	FIG	FIGURE
	FLA	FULL LOAD AMPS
	FLG	FLANGE
	FO	FLOW ORIFICE
	FOB	FLAT ON BOTTOM
	FOT	FLAT ON TOP
	FPM	FEET PER MINUTE
	FPS	FEET PER SECOND
	FPT	FEMALE PIPE THREAD
	FQI	FLOW TOTALIZER, INDICATING
	FR	FLOW RECORDER
	FRC	FLOW RECORDING CONTROLLER
	FRP	FIBERGLASS REINFORCED PLASTIC
	FSH	FLOW SWITCH HIGH
	FSL	FLOW SWITCH LOW
	FT	FEET, FLOW TRANSMITTER
	FT-LB	FOOT-POUND
	FTG	FOOTING
G	GA	GAGE, GAUGE
	GAL	GALLONS
	GALV	GALVANIZED
	GES	GROUND WATER EXTRACTION SYSTEM
	GETS	GROUND WATER EXTRACTION AND TREATMENT SYSTEM
	GND	GROUND
	GPD	GALLONS PER DAY
	GPH	GALLONS PER HOUR
	GPM	GALLONS PER MINUTE
	GPS	GALLONS PER SECOND
	GRD	SURFACE GRADE
H	H	HEATER
	HE	HEAT EXCHANGER
	HIC	HAND INDICATING CONTROLLER
	HOA	HAND, OFF, AUTO SWITCH
	HP	HORSEPOWER
	HS	HAND SWITCH
	HZ	HERTZ
I	ID	INSIDE DIAMETER
	IHP	INDICATED HORSEPOWER
	IMC	INTERMEDIATE METAL CONDUIT
	IN	INCH
	IN-LB	INCH-POUNDS
	INL	INLET
	INSUL	INSULATE, INSULATION
	INV	INVERT ELEVATION
J	JT	JOINT
K	KHZ	KILOHERTZ
	KVA	KILOVOLT-AMPERE
	KW	KILOWATT
	KWH	KILOWATT-HOUR
L	LAH	LEVEL ALARM HIGH
	LAL	LEVEL ALARM LOW
	LB	POUND WEIGHT
	LB-FT	POUND-FOOT
	LB-IN	POUND-INCH
	LC	LEVEL CONTROLLER
	LCV	LEVEL CONTROL VALVE
	LEL	LOWER EXPLOSIVE LIMIT
	LI	LEVEL INDICATOR
	LIC	LEVEL INDICATING CONTROLLER
	LR	LONG RADIUS, LEVEL RECORDER
	LRC	LEVEL RECORDING CONTROLLER
	LSH	LEVEL SWITCH HIGH
	LSHL	LEVEL SWITCH HIGH AND LOW
	LSL	LEVEL SWITCH LOW
	LT	LEVEL TRANSMITTER
M	M	MOTOR
	MA	MILLIAMPERE
	MAX	MAXIMUM
	MFR	MANUFACTURER
	MG	MILLIGRAM
	MG/L	MILLIGRAMS PER LITER
	MGD	MILLION GALLONS PER DAY
	MI	MALLEABLE IRON
	MIN	MINIMUM
	MISC	MISCELLANEOUS
	MM	MILLIMETER
	MPC	MAXIMUM PERMISSIBLE CONCENTRATION
	MPT	MALE PIPE THREAD
	MV	MILLIVOLT
N	N	NORTH
	NC	NORMALLY CLOSED
	NIP	NIPPLE
	NO	NUMBER, NORMALLY OPEN
	NPT	NOMINAL PIPE TAPER
	NTS	NOT TO SCALE
O	OCEW	ON CENTER EACH WAY
	OD	OUTSIDE DIAMETER
	OX	OXIDIZER
P	P	PRESSURE, PUMP
	PC	PRESSURE CONTROLLER
	PCF	POUNDS PER CUBIC FOOT
	PCV	PRESSURE CONTROL VALVE
	PH	PHASE
	PI	PRESSURE INDICATOR
	PIC	PRESSURE INDICATING CONTROLLER
	PLC	PROGRAMMABLE LOGIC CONTROLLER
	POE	PLAIN ONE END
	PPB	PARTS PER BILLION
	PPM	PARTS PER MILLION
	PR	PRESSURE RECORDER
	PRC	PRESSURE RECORDING CONTROLLER
	PROJ	PROJECTION
	PRV	PRESSURE RELIEF VALVE
	PS	PIPE SUPPORT
	PSF	POUNDS PER SQUARE FOOT
	PSH	PRESSURE SWITCH HIGH
	PSHL	PRESSURE SWITCH HIGH AND LOW
	PSI	POUNDS PER SQUARE INCH
	PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
	PSIG	POUNDS PER SQUARE INCH, GAUGE
	PSL	PRESSURE SWITCH LOW
	PT	PRESSURE TRANSMITTER, PRESSURE TANK
	PVC	POLYVINYL CHLORIDE
Q	QTY	QUANTITY
R	R	REACTOR
	RAD	RADIUS
	RCP	REINFORCED CONCRETE PIPE
	RED BUSH	REDUCING BUSHING
	RED TEE	REDUCING TEE
	REQD	REQUIRED
	REV	REVISION
	RF	RAISED FACE
	RPM	REVOLUTIONS PER MINUTE
	RPS	REVOLUTIONS PER SECOND
	RW	RECOVERY WELL
S	S	SOUTH
	S40	SCHEDULE 40
	S80	SCHEDULE 80
	SCFM	STANDARD CUBIC FEET PER MINUTE
	SD	STORM DRAIN
	SEC CONT	SECONDARY CONTAINMENT
	SHT	SHEET
	SLIP	POLYVINYL CHLORIDE PIPING SOCKET
	SO	SLIP ON
	SOC	METAL PIPING SOCKET
	SPDT	SINGLE POLE DOUBLE THROW
	SPEC	SPECIFICATION
	SPIG	POLYVINYL CHLORIDE PIPING SPIGOT
	SPST	SINGLE POLE SINGLE THROW
	SQ FT	SQUARE FOOT
	SQ IN	SQUARE INCH
	SR	SHORT RADIUS
	SS	STAINLESS STEEL, SANITARY SEWER
	ST	SAMPLE TAP, STORAGE TANK
	STD	STANDARD
	STP	STANDARD TEMPERATURE AND PRESSURE
	SV	SOLENOID VALVE
T	T	TANK
	TC	TEMPERATURE CONTROLLER
	TCV	TEMPERATURE CONTROL VALVE
	TEMP	TEMPERATURE
	THD	THREADED
	TI	TEMPERATURE INDICATOR
	TIC	TEMPERATURE INDICATING CONTROLLER
	TOC	TOP OF CONCRETE
	TOE	THREADED ONE END
	T-O-LET	THREAD-O-LET
	TOP	TOP OF PIPE
	TOS	TOP OF STEEL
	TRC	TEMPERATURE RECORDING CONTROLLER
	TSH	TEMPERATURE SWITCH HIGH
	TSHL	TEMPERATURE SWITCH HIGH AND LOW
	TSL	TEMPERATURE SWITCH LOW
	TT	TEMPERATURE TRANSMITTER
	TYP	TYPICAL
U	U/G	UNDERGROUND
	UG	MICROGRAMS
	UG/L	MICROGRAMS PER LITER
	UM	MICROMETER
	UST	UNDERGROUND STORAGE TANK
V	V	VOLTS, VALVE, VESSEL
	VAC	VACUUM, VOLTS AC
	VDC	VOLTS DC
	VES	VAPOR EXTRACTION SYSTEM
	VETS	VAPOR EXTRACTION AND TREATMENT SYSTEM
	VEW, VW	VAPOR EXTRACTION WELL
	VRV	VACUUM RELIEF VALVE
W	W	WEST
	W-O-LET	WELD-O-LET
	WOG	WATER, OIL, GAS
	WP	WORK POINT
	WT	WEIGHT
	WWF	WELDED WIRE FABRIC
X	XCV	UNCLASSIFIED CONTROL VALVE
	XIC	UNCLASSIFIED INDICATING CONTROLLER
	XSH	UNCLASSIFIED SWITCH HIGH
	XSL	UNCLASSIFIED SWITCH LOW
Y	YD	YARD

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Date 12/29/06
Drawn DJS
Prepared RLH
Reviewed JCT

GROUND WATER REMEDIATION SYSTEM
STANDARD ABBREVIATIONS

Project No. 13042.05
Drawing No. RN-A-I-002
File Name 1304205-002
REVISION
NUMBER | DATE
10/03
Sheet 2 of 13

VALVES AND ACTUATORS

- 3–WAY VALVE
- 4–WAY VALVE
- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- DIAPHRAGM VALVE
- GATE VALVE
- GLOBE VALVE
- NEEDLE VALVE
- PLUG VALVE
- PRESSURE RELIEF VALVE
- VACUUM RELIEF VALVE
- DIAPHRAGM ACTUATOR
- DIAPHRAGM ACTUATOR WITH MANUAL OVERRIDE
- ELECTRIC MOTOR ACTUATOR (M)
- SOLENOID ACTUATOR (S)
- MANUALLY OPERATED ACTUATOR
- BACK PRESSURE REGULATOR WITH EXTERNAL TAP
- BACK PRESSURE REGULATOR, SELF CONTAINED
- PRESSURE REDUCING REGULATOR WITH EXTERNAL TAP
- PRESSURE REDUCING REGULATOR, SELF CONTAINED

DETAILS AND SECTIONS

- X / XXX — INDICATES DETAIL NUMBER; INDICATES DRAWING OR SHEET ON WHICH DETAIL IS SHOWN
- X / XXX — INDICATES AREA SHOWN IN REFERENCED DETAIL
- X / XXX — DETAIL CUT/ELEVATION REFERENCE. ARROW INDICATES DIRECTION OF VIEW.
- A — A' — INDICATES SECTION DESIGNATION

METERS

- ANNUBAR
- ORIFICE METER
- PITOT TUBE
- POSITIVE DISPLACEMENT METER
- ROTAMETER
- TURBINE METER
- VENTURI

PIPING AND INSTRUMENTATION

- AE — AIR ELIMINATOR
- BASKET STRAINER
- Y–STRAINER
- OPEN DRAIN
- FLAME ARRESTOR
- TI 101 — INSTRUMENT, LOCALLY MOUNTED
- TIC 101 — INSTRUMENT, PANEL MOUNTED
- I — INTERLOCK
- REDUCER BUSHING
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- PRIMARY PROCESS LINE AND FLOW DIRECTION
- INSTRUMENT ELECTRICAL LINE
- INSTRUMENT CAPILLARY TUBING
- FLANGE
- SOCKET, THREADED, OR WELD CONNECTION
- COUPLER
- FLEXIBLE HOSE
- UNION
- CAP
- PLUG
- HOSE CAMLOCK CONNECTION
- ORIFICE
- EDUCTOR
- INSULATION
- BURST DISK

ELECTRICAL

- CENTRIFUGAL SWITCH, NC
- CENTRIFUGAL SWITCH, NO
- FLOW SWITCH, NC
- FLOW SWITCH, NO
- LEVEL SWITCH, NC
- LEVEL SWITCH, NO
- LIMIT SWITCH, NC
- LIMIT SWITCH, NO
- PRESSURE SWITCH, NC
- PRESSURE SWITCH, NO
- TEMPERATURE SWITCH, NC
- TEMPERATURE SWITCH, NO
- TIME DELAY SWITCH, NC
- TIME DELAY SWITCH, NO
- PUSHBUTTON NC
- PUSHBUTTON NO
- SINGLE POLE, SINGLE THROW SWITCH
- SINGLE POLE, DOUBLE THROW SWITCH
- DOUBLE POLE, DOUBLE THROW SWITCH
- MULTIPOSITION SWITCH
- ROTARY SWITCH
- SINGLE CELL BATTERY
- MULTICELL BATTERY
- GROUND

- RES — RESISTOR
- TRANSFORMER
- M1 — MOTOR
- R1 — RELAY COIL
- C1 — CONTACTOR COIL
- PLC CONTACT, NC
- PLC CONTACT, NO
- RELAY CONTACT, NC
- RELAY CONTACT, NO
- FUSED DISCONNECT SWITCH
- HEATER OR SOLENOID COIL
- THERMAL OVERLOAD SWITCH
- OL — MOTOR STARTER, RESETTABLE OVERLOAD CONTACT
- G — LAMP, LETTER INDICATES COLOR
- AREA LIGHT
- TWO WIRE PLUG
- THREE WIRE PLUG
- THERMOCOUPLE
- HOUR — METER, TYPE INDICATED
- ø — PHASE (e.g. 3ø)
- 10 — FUSE, NUMBER INDICATES RATING
- 20 — CIRCUIT BREAKER, NUMBER INDICATES RATING

EQUIPMENT

- BLOWER AND MOTOR
- CENTRIFUGAL HORIZONTAL PUMP AND MOTOR
- SUBMERSIBLE PUMP AND MOTOR
- CENTRIFUGAL COMPRESSOR AND MOTOR
- M / OR / M — CENTRIFUGAL WELL PUMP AND MOTOR
- PISTON COMPRESSOR AND MOTOR
- DIAPHRAGM PUMP AND MOTOR
- GEAR PUMP AND MOTOR
- HEAT EXCHANGER
- ELECTRIC HEATER
- PACKED COLUMN
- LINE FILTER

GENERAL

- GROUND WATER EXTRACTION WELL
- MONITORING WELL
- SOIL BORING
- SPARGE WELL
- VAPOR EXTRACTION WELL
- SATURATED ZONE

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Date 12/29/06
Drawn DJS
Prepared RLH
Reviewed JCT

GROUND WATER REMEDIATION SYSTEM SYMBOLS LEGEND

Project No. 13042.05
Drawing No. RN–A–I–003
File Name 1304205–003
REVISION
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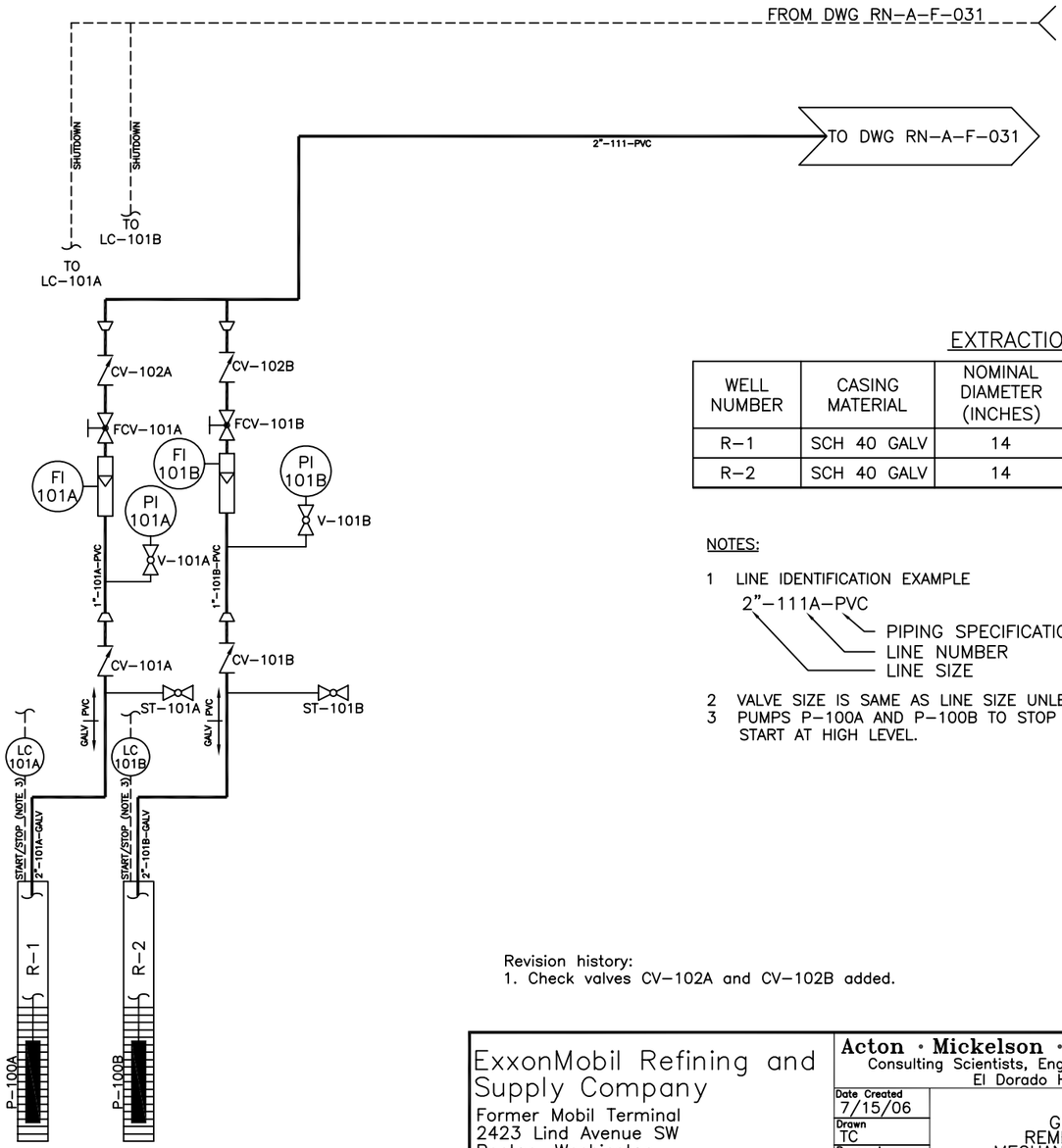
PIPING KEY

GALV – GALVANIZED STEEL, S40
PVC – POLYVINYL CHLORIDE, S80

P–100A,B
EXTRACTION PUMPS
10 GPM EACH AT
138 FT TOTAL DYNAMIC HEAD
0.5 HP EACH



EXTRACTION WELL DATA

WELL NUMBER	CASING MATERIAL	NOMINAL DIAMETER (INCHES)	TOTAL DEPTH (FEET)	SCREENED INTERVAL (FEET)	SLOT SIZE (INCHES)
R–1	SCH 40 GALV	14	15	3–15	0.020
R–2	SCH 40 GALV	14	12	4–12	0.020

NOTES:

1 LINE IDENTIFICATION EXAMPLE
2"–111A–PVC
– PIPING SPECIFICATION (SEE KEY)
– LINE NUMBER
– LINE SIZE

2 VALVE SIZE IS SAME AS LINE SIZE UNLESS OTHERWISE NOTED.
3 PUMPS P–100A AND P–100B TO STOP AT LOW LEVEL, START AT HIGH LEVEL.

Revision history:
1. Check valves CV–102A and CV–102B added.

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Date Created 7/15/06
Drawn TC
Prepared JCT
Reviewed

GROUND WATER REMEDIATION SYSTEM
MECHANICAL FLOW DIAGRAM
(1 OF 2)

Project No. 13042.05
Drawing No. RN–A–F–030
File Name 1304205–004
REVISION
NUMBER 1 | DATE 4/29/09
Sheet 4 of 13

T–210
EQUALIZATION TANK
650 GALLONS
POLYETHYLENE

V–220
OIL/WATER SEPARATOR
24 GPM
165 GAL OPERATING VOLUME

T–280
FREE PRODUCT STORAGE TANK
55 GALLONS
CARBON STEEL

P–290
FREE PRODUCT TRANSFER PUMP
UNKNOWN GPM
UNKNOWN FT DIS HEAD
0.75 HP

T–230
FEED TANK
650 GALLONS
POLYETHYLENE

P–240
FEED PUMP
UNKNOWN GPM
UNKNOWN FT DIS HEAD
1 HP

F–250A
BAG FILTER
25 MICRON
SIZE 2 FILTER

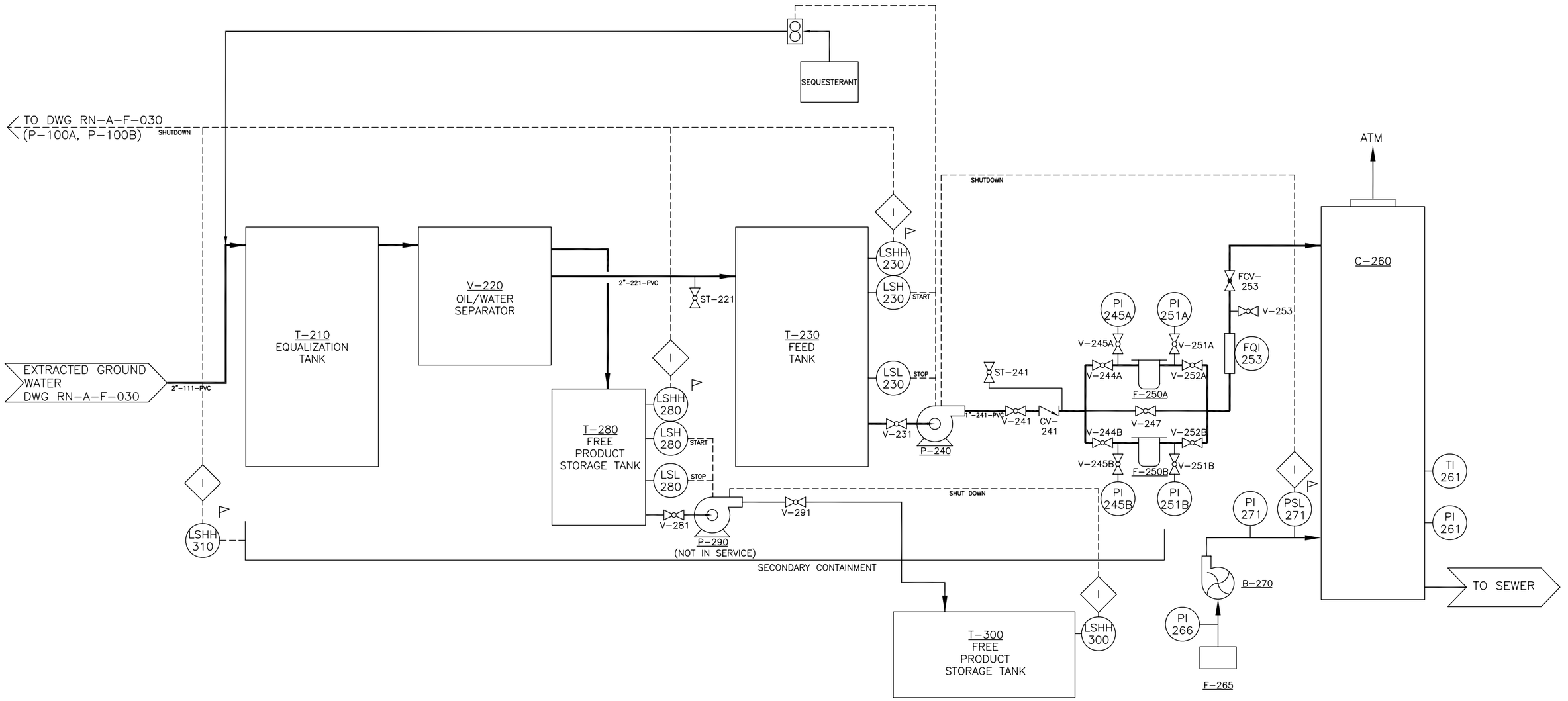
F–250B
BAG FILTER
25 MICRON
SIZE 2 FILTER

B–270
AIR STRIPPER BLOWER
488 SCFM ESTIMATED
AT 0.7 PSIG DIS
2 HP

F–265
AIR FILTER
DP OF 0.008 IN H20
AT 600 SCFM

C–260
AIR STRIPPER
UNKNOWN GPM
PRESSURE RATING: UNKNOWN
BENZENE REMOVAL: UNKNOWN
MTBE REMOVAL: UNKNOWN
FIBERGLASS REINFORCED PLASTIC

T–300
FREE PRODUCT STORAGE TANK
1,000 GALLONS



⚐ – DENOTES CRITICAL SAFETY DEVICE

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Prepared JCT
Reviewed

GROUND WATER
REMEDIATION SYSTEM
MECHANICAL FLOW DIAGRAM
(2 OF 2)

Project No. 13042.05
Drawing No. RN–A–F–031
File Name 1304205–005

REVISION	
NUMBER	DATE
2	8/7/08

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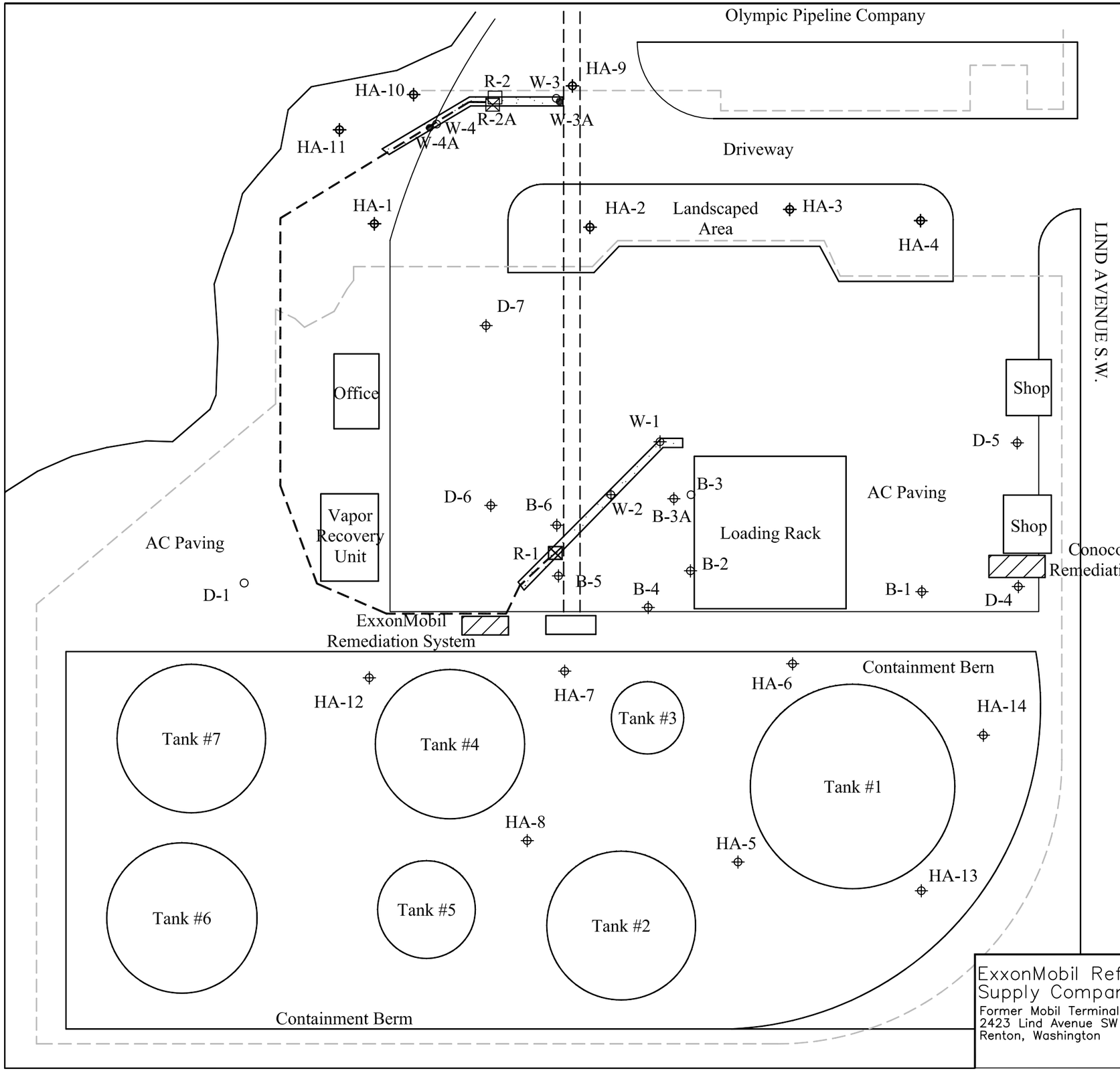

Legend

- Product Recovery Well
- Recovery Well Abandoned
- Monitoring Well
- Monitoring Well Abandoned
- Cleanout
- Olympic Pipeline
- Remediation System Underground Piping and Electrical Conduit Trench
- Gravel Filled Product Recovery Trench
- Remediation System
- Aboveground Storage Tank

NOTE:

ALL FEATURE LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

REFERENCE:

KLEINFELDER COMPILED FROM HART CROWSER
"Site Plan and New Construction" 8/19/1997.

N

0 60 120

Feet

Revision History:
1. Monitoring well B-3 abandoned and monitoring well B-3A installed November 2007. Monitoring wells W-3 and W-4, and recovery well R-2 abandoned November 2008. Cleanouts W-3A and W-4A, and recovery well R-2A installed December 2008.

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Date Created: 4/25/07
Drawn: TC
Prepared: JCT
Reviewed:

GROUND WATER REMEDIATION SYSTEM
SITE MAP WITH REMEDIATION AND MONITORING WELL LOCATIONS

Project No. 13042.05
Drawing No. RN-A-P-020
File Name 1304205-008

REVISION NUMBER	DATE
1	4/30/09

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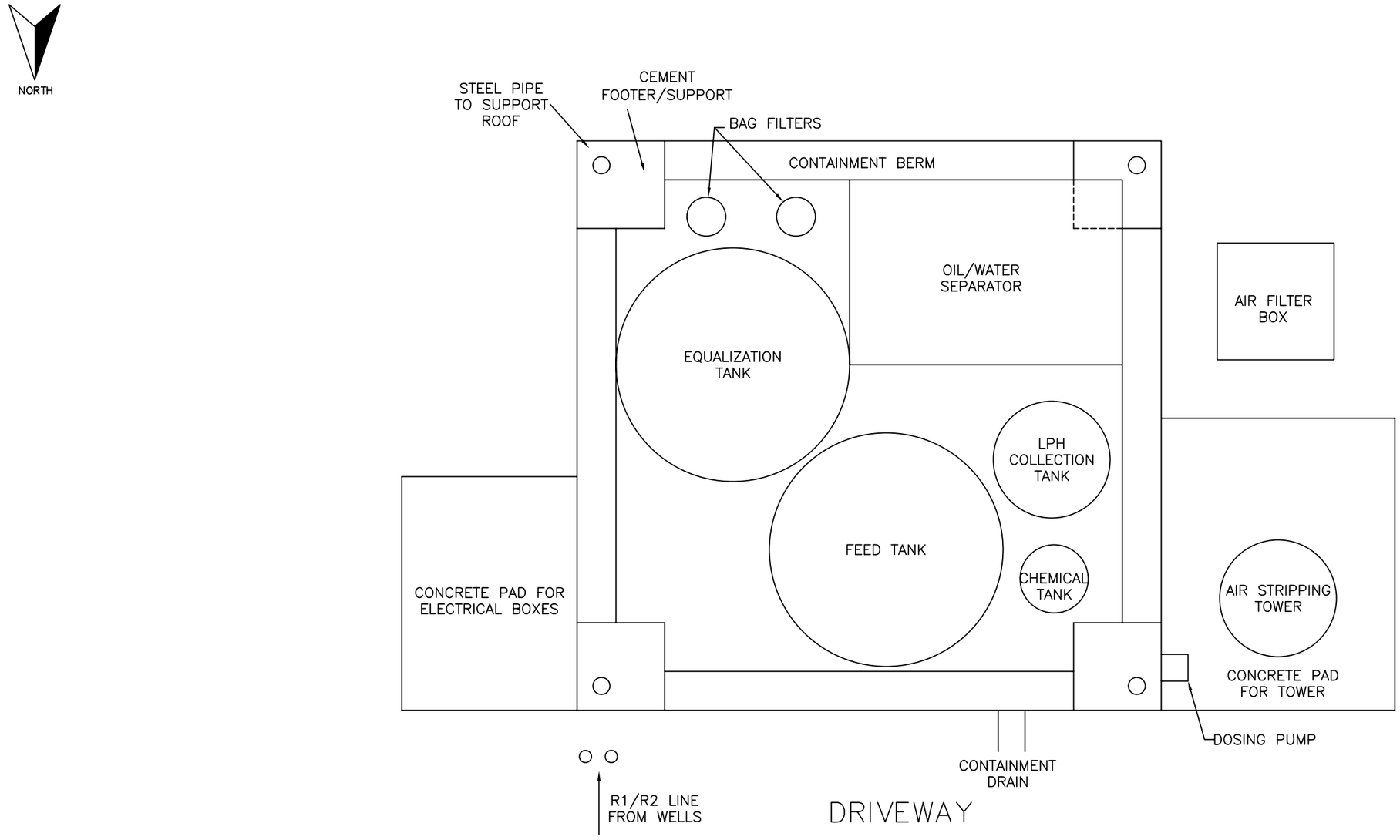

Revision history:
1. New bag filter locations added.

0 1 2
Feet

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Date Created 5/3/07
Drawn TC
Prepared JRS
Reviewed

GROUND WATER REMEDIATION
SYSTEM TREATMENT
EQUIPMENT PLOT PLAN

Project No. 13042.05
Drawing No. RN-A-P-021
File Name 1304205-009

REVISION	
NUMBER	DATE
1	4/29/09

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Date Created	5/3/07
Drawn	TC
Prepared	JRS
Reviewed	

Project No.	13042.05
Drawing No.	RN-A-M-800
File Name	1304205-010
REVISION	
NUMBER	DATE
0	5/3/07
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Drawn	TC
Prepared	JRS
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Project No.	13042.05
Drawing No.	RN-A-M-801
File Name	1304205-011

REVISION	
NUMBER	DATE
0	5/3/07

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Project No.	13042.05
Drawing No.	RN-A-M-802
File Name	1304205-012
REVISION	
NUMBER	DATE
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Project No.	13042.05
Drawing No.	RN-A-E-010
File Name	1304205-013
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NUMBER	DATE
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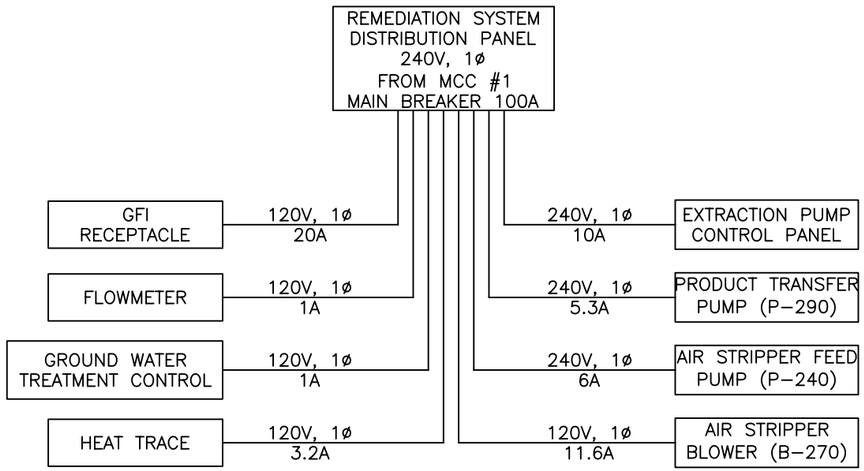
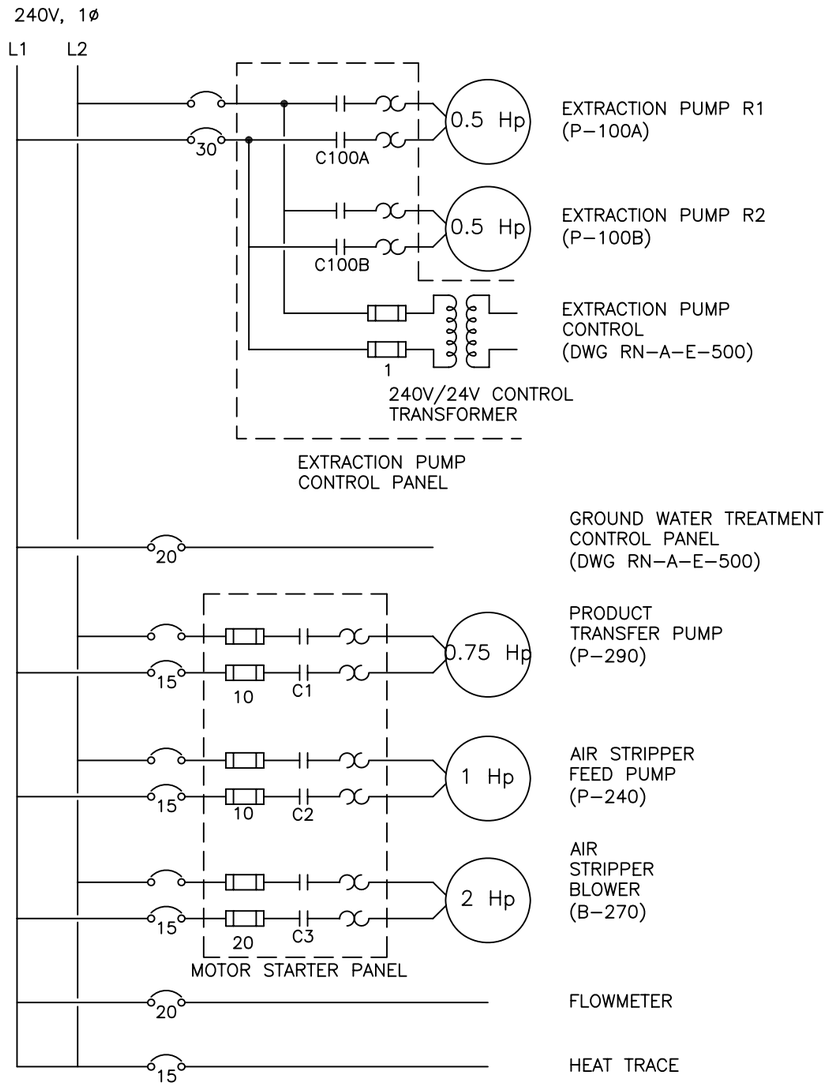


BLOCK



TWO–LINE DISTRIBUTION

Revision history:
1. Heat trace added.

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Date Created: 10/31/06
Drawn: TC
Prepared: JCT
Reviewed:

GROUND WATER REMEDIATION
SYSTEM ELECTRICAL
BLOCK AND TWO–LINE
DISTRIBUTION DIAGRAM

Project No. 13042.05
Drawing No. RN–A–E–020
File Name 1304205–006

REVISION	
NUMBER	DATE
1	5/4/09

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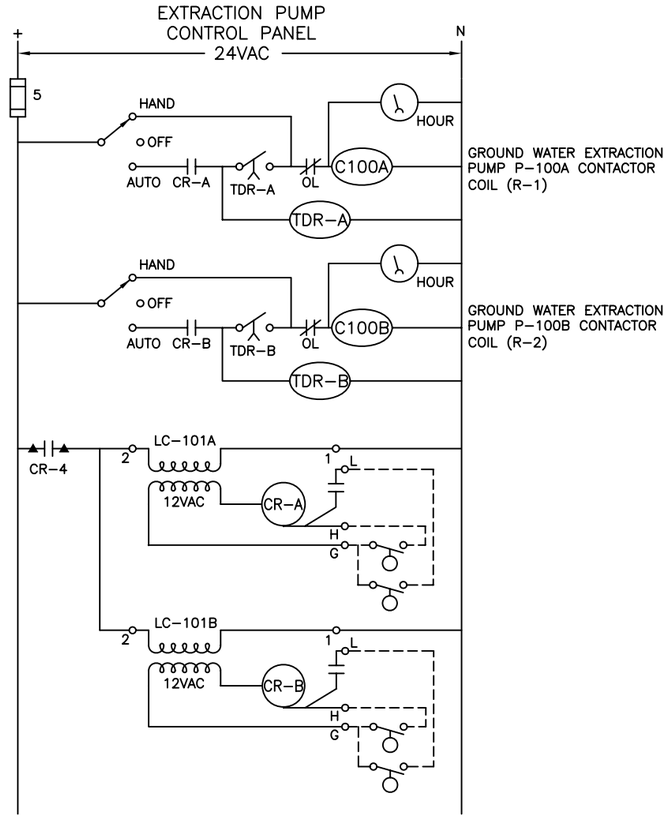
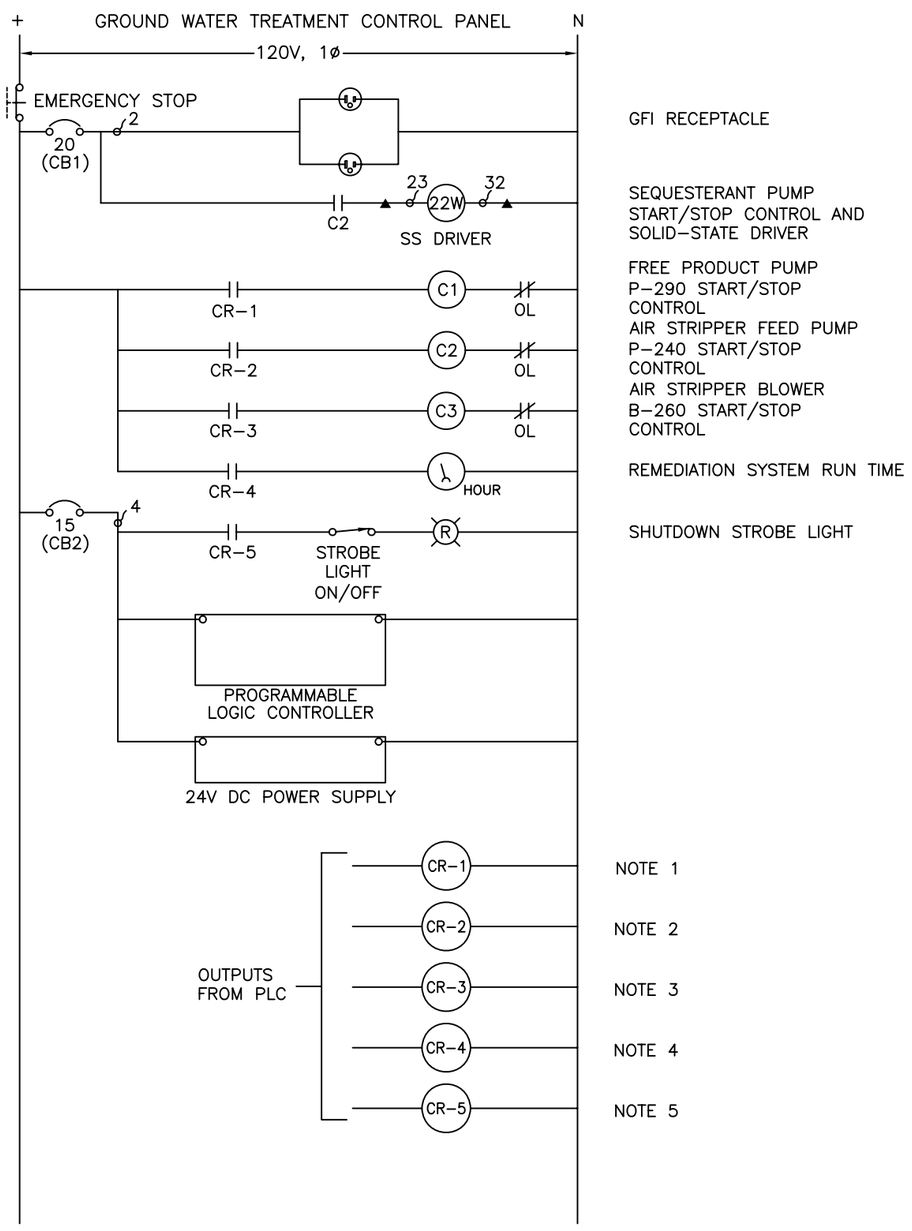


NOTES:

1. IN AUTO MODE, CR-1 IS ENERGIZED UPON CLOSURE OF FREE PRODUCT TANK LSL-280 AND LSH-280 (WET CONDITION). CR-1 DE-ENERGIZES UPON OPENING OF BOTH LSL-280 AND LSH-280 (DRY CONDITION). CR-1 ENERGIZES WITH THE FREE PRODUCT PUMP HOA SWITCH TURNED TO HAND.
2. IN AUTO MODE, CR-2 ENERGIZES AFTER AN APPROXIMATE 15-SECOND DELAY UPON CLOSURE OF AIR STRIPPER FEED TANK LSH-230 (WET CONDITION) AND DE-ENERGIZES UPON OPENING OF LSH-230 (DRY CONDITION). OPENING OF AIR STRIPPER BLOWER PSL-271 DE-ENERGIZES CR-2 REGARDLESS OF LSH-230 CONDITION. CR-2 ENERGIZES WITH THE AIR STRIPPER FEED PUMP HOA SWITCH TURNED TO HAND, EXCEPT WHEN PSL-271 IS OPEN.
3. IN AUTO MODE, CR-3 ENERGIZES UPON CLOSURE OF AIR STRIPPER FEED TANK LSH-230 (WET CONDITION), AND DE-ENERGIZES AFTER AN APPROXIMATE 60-SECOND DELAY UPON OPENING OF LSH-230 (DRY CONDITION). CR-3 ALSO ENERGIZES WITH AIR STRIPPER FEED PUMP HOA SWITCH TURNED TO HAND OR UPON CLOSURE OF AIR STRIPPER LSHH-230. CR-3 ENERGIZES WITH THE AIR STRIPPER BLOWER HOA SWITCH TURNED TO HAND.
4. CR-4 ENERGIZES TO OPERATE WELLS R-1 (PUMP 100A) AND R-2 (PUMP 100B). CR-4 DE-ENERGIZES UPON CLOSING OF SECONDARY CONTAINMENT LSHH-310 (WET CONDITION). CR-4 ALSO DE-ENERGIZES UPON CLOSING OF AIR STRIPPER FEED TANK LSHH-230 (WET CONDITION) OR FREE PRODUCT STORAGE TANK LSHH-280 (WET CONDITION). REGARDLESS OF ALARM CONDITIONS, CR-4 ENERGIZES WHEN THE LOW-LEVEL BYPASS SWITCH IS TURNED ON. UNLIKE LSHH-310, LSHH-230 AND LSHH-280 LATCH UPON CLOSING AND MUST BE RESET BY TURNING ON THE LOW-LEVEL BYPASS SWITCH.
5. CR-5 ENERGIZES UPON CLOSING OF SECONDARY CONTAINMENT LSHH-310 (WET CONDITION) AND OPENING OF AIR STRIPPER BLOWER PSL-271 (LOW PRESSURE). CR-5 ALSO ENERGIZES ON CLOSING OF AIR STRIPPER FEED TANK LSHH-230 (WET CONDITION) AND FREE PRODUCT STORAGE TANK LSHH-280 (WET CONDITION). CR-5 DE-ENERGIZES WHEN THE LOW-LEVEL BYPASS SWITCH IS TURNED ON. ALL ALARM LIGHTS ARE ALSO DISABLED WITH THE LOW-LEVEL BYPASS SWITCH TURNED ON.



REVISION HISTORY:

1. DRAWING MODIFIED TO REFLECT LC-101A AND LC-101B AS SOLID STATE RELAYS.
2. STROBE LIGHT ON/OFF SWITCH ADDED.

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Date Created: 10/31/06
Drawn: TC
Prepared: JCT
Reviewed:

GROUND WATER REMEDIATION SYSTEM CONTROL DIAGRAM

Project No.: 13042.05
Drawing No.: RN-A-E-500
File Name: 1304205-007
REVISION
NUMBER: 2
DATE: 08/11/08
Sheet 13 of 13

PLC LADDER DIAGRAM

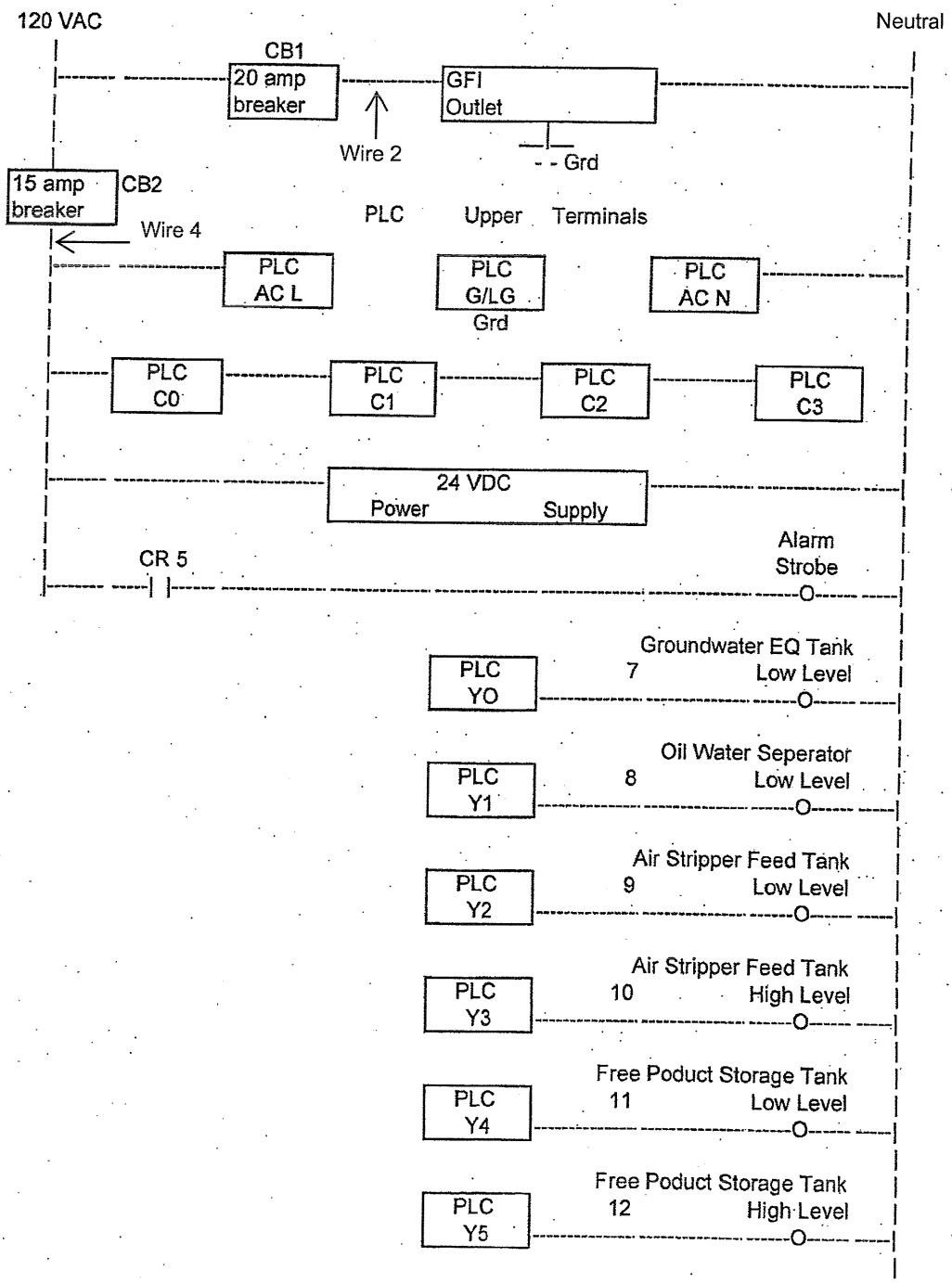
Renton Remediation Project **AS BUILT**
Kleinfelder, Inc. 2/14/03

Legend

------O------	Lamp - Red
-----| |-----	NO Contact
-----( )-----	Relay Coil
PLC X##	PLC Input Terminal
PLC Y##	PLC Output Terminal
--o o-----	Switch
32	Terminal Block (Labeled)

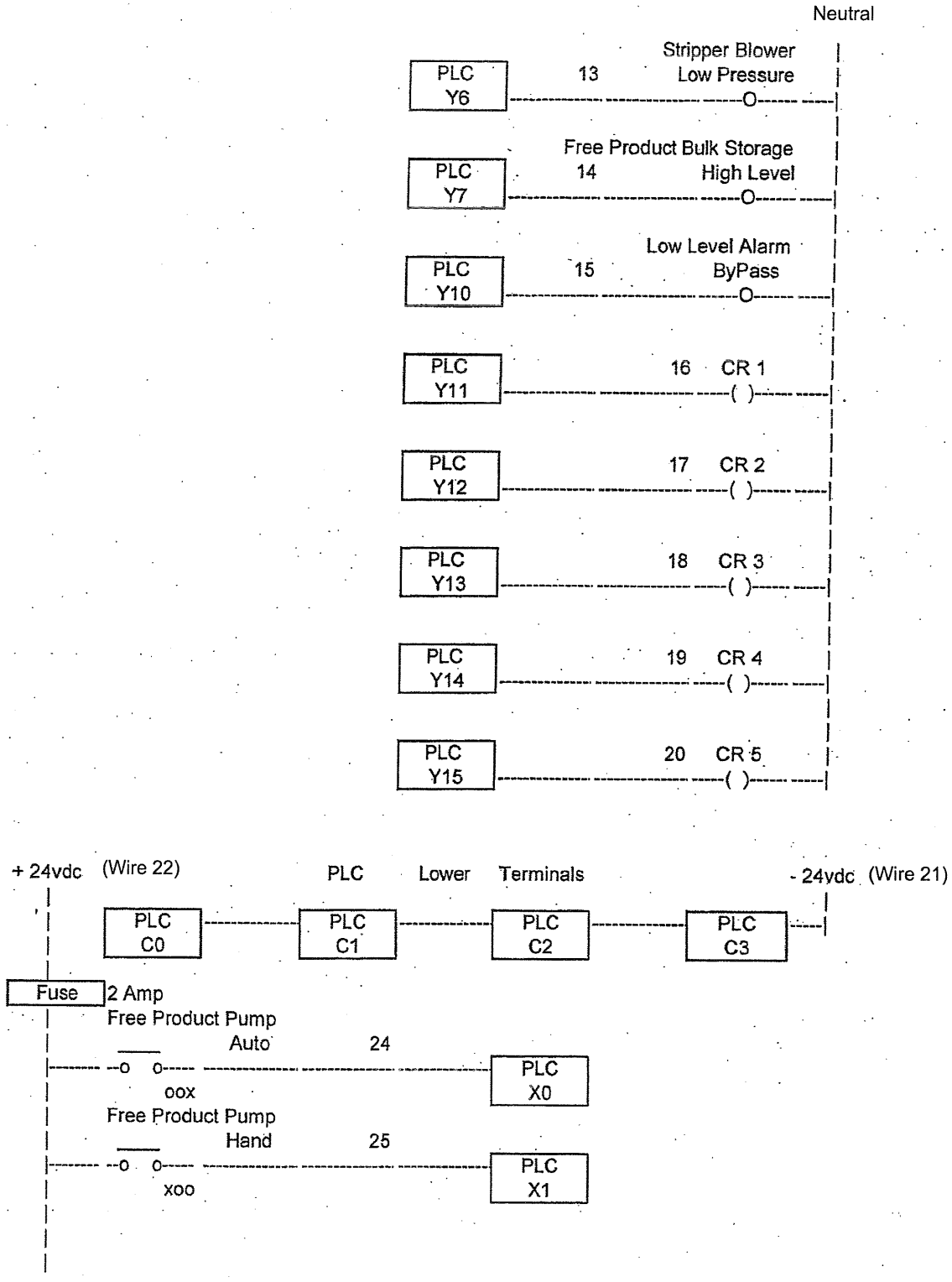
R&B Control Systems
Randy Robbins

MODIFIED BY AME APRIL 2007



Prepared by Randy Robbins 4/30/03

MODIFIED BY AME APRIL 2007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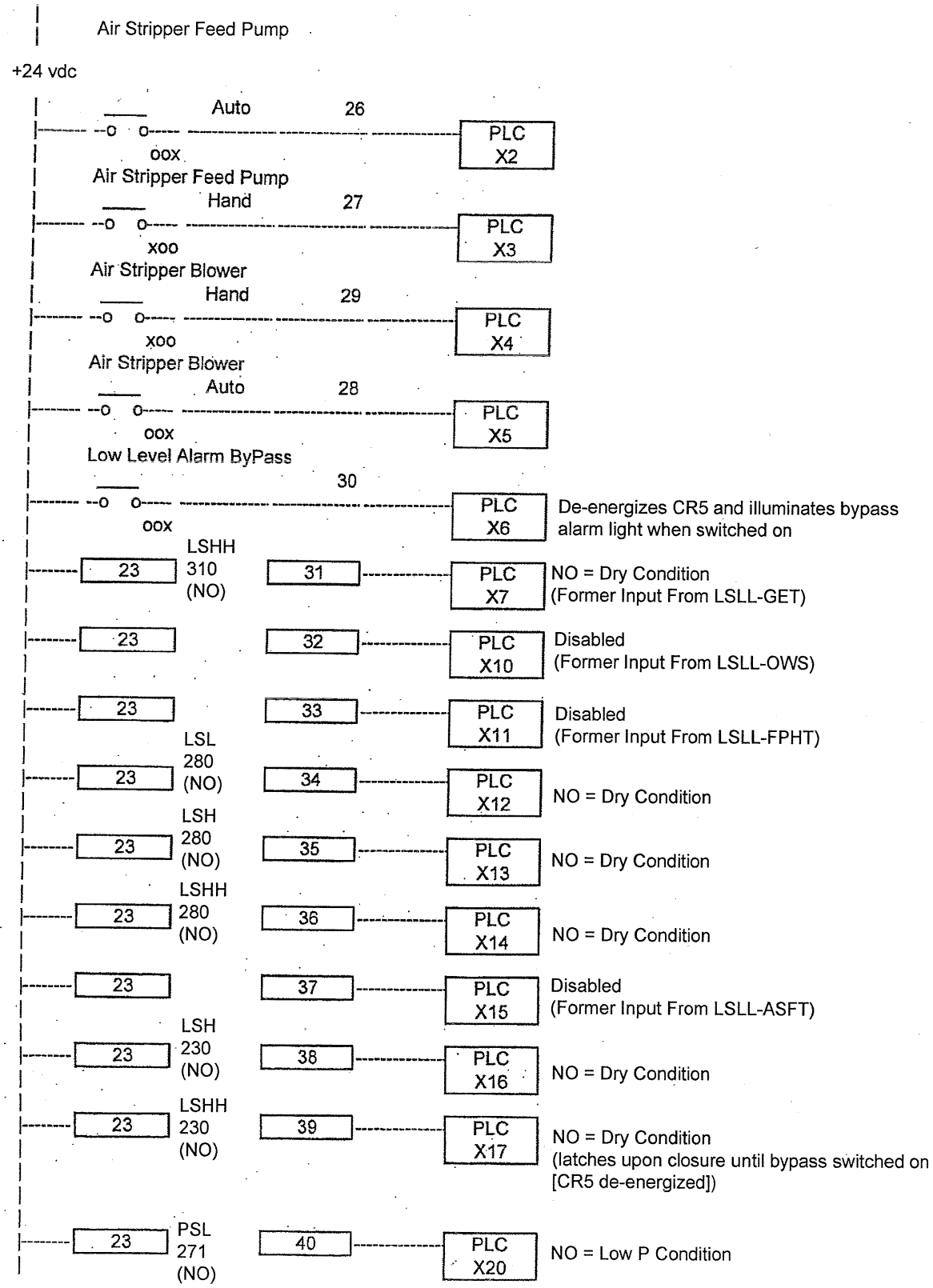
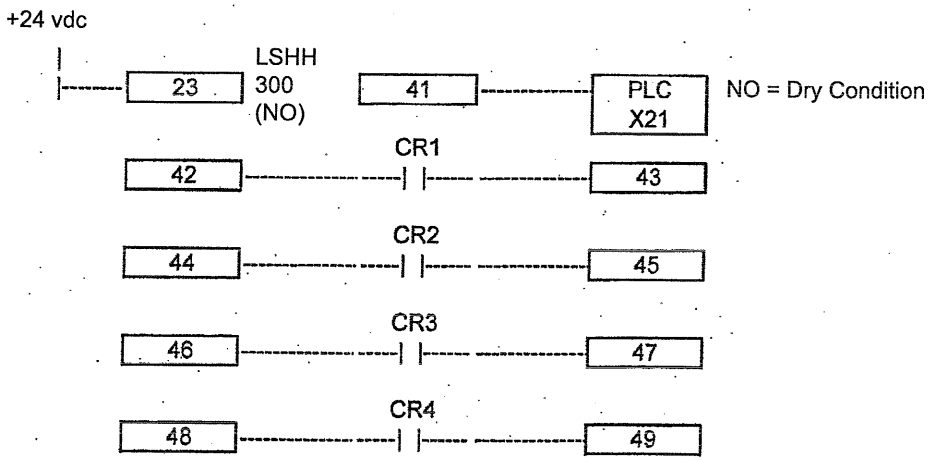
PLC Y6
13
Stripper Blower Low Pressure
PLC Y7
14
Free Product Bulk Storage High Level
PLC Y10
15
Low Level Alarm ByPass
PLC Y11
16
CR 1
PLC Y12
17
CR 2
PLC Y13
18
CR 3
PLC Y14
19
CR 4
PLC Y15
20
CR 5
+ 24vdc
(Wire 22)
PLC
Lower
Terminals
- 24vdc
(Wire 21)
PLC C0
PLC C1
PLC C2
PLC C3
Fuse
2 Amp
Free Product Pump
Auto
24
oox
PLC X0
Free Product Pump
Hand
25
xoo
PLC X1


Air Stripper Feed Pump
+24 vdc
Auto
26
oox
PLC X2
Air Stripper Feed Pump
Hand
27
xoo
PLC X3
Air Stripper Blower
Hand
29
xoo
PLC X4
Air Stripper Blower
Auto
28
oox
PLC X5
Low Level Alarm ByPass
30
oox
PLC X6
De-energizes CR5 and illuminates bypass alarm light when switched on
LSHH 310 (NO)
23
31
PLC X7
NO = Dry Condition (Former Input From LSLL-GET)
23
32
PLC X10
Disabled (Former Input From LSLL-OWS)
23
33
PLC X11
Disabled (Former Input From LSLL-FPHT)
LSL 280 (NO)
23
34
PLC X12
NO = Dry Condition
LSH 280 (NO)
23
35
PLC X13
NO = Dry Condition
LSHH 280 (NO)
23
36
PLC X14
NO = Dry Condition
23
37
PLC X15
Disabled (Former Input From LSLL-ASFT)
LSH 230 (NO)
23
38
PLC X16
NO = Dry Condition
LSHH 230 (NO)
23
39
PLC X17
NO = Dry Condition (latches upon closure until bypass switched on [CR5 de-energized])
PSL 271 (NO)
23
40
PLC X20
NO = Low P Condition


+24 vdc
23
LSHH
300
(NO)
41
PLC
X21
NO = Dry Condition
CR1
42
43
CR2
44
45
CR3
46
47
CR4
48
49

APPENDIX D

Sample Operations and Maintenance Log Sheet

MAINTENANCE TRACKING LOG
PREVENTIVE MAINTENANCE CHECK LIST ITEMS

COMPONENTS	FREQUENCY	MAINTENANCE REQUIREMENTS	DATE OF COMPLETION	INITIALS
Ground Water Bag Filters	Semi-Monthly	Check the pressure drop across pressure gauges PI-245A and PI-251A, and PI-245B and PI-251B. If the pressure drop is greater than 5 psi, replace filter.		
Stripper Blower Air Filter	Semi-Monthly	Check the pressure drop across pressure gauges PI-266 and PS-271. If the pressure drop is greater than two inches water column, replace filter.		
Fire Extinguisher	Monthly / Annually	Monthly checks require visual inspection of pressure gauge for indication of pressure loss. Annual maintenance requires service by contracted professional inspector. (Date Performed _____)	/	/
Eyewash / First Aid Kit	Monthly	Check personal eyewash for fluid loss and expiration date. Check first aid kit for completeness, any loss of fluids, and expiration dates.	/	/
Oil/Water Separator	Quarterly	Visual inspection of filter bank and secondary weir.	/	/
Piping Inspection	Semi-Annually	Check all joints of piping conections and look for fatigue in all piping runs	/	/

CRITICAL SAFETY CHECK LIST ITEMS

COMPONENTS	FREQUENCY	MAINTENANCE REQUIREMENTS	DATE OF COMPLETION	INITIALS
Low Blower Pressure Switch (PSL-271)	Semiannual	Reference Operation and Maintenance Manual		
Secondary Containment High Level (LSHH-310)	Semiannual	Reference Operation and Maintenance Manual		
Stripper Feed Tank High Level (LSHH-230)	Semiannual	Reference Operation and Maintenance Manual		
Product Storage Tank High Level (LSHH-280)	Semiannual	Reference Operation and Maintenance Manual		

APPENDIX E

Site-Specific Health and Safety Plan

EMERGENCY RESPONSE PLAN

In the event of fire, flood, earthquake, or spill, the following procedures should be followed:

1. If the event causes immediate threat to life or health, evacuate to the emergency assembly area and remain in the assembly area until receiving further instruction from ConcoPhillips. The evacuation routes and assembly area are shown on the attached diagram.

2. Remediation equipment has an emergency stop pushbutton that can be pressed to stop remediation equipment operation. Location of the emergency stop push button is on the ground water treatment control panel, facing the paved area. Circuit breakers for the remediation equipment are located in the remediation system distribution panel.

3. Call 911 as appropriate.

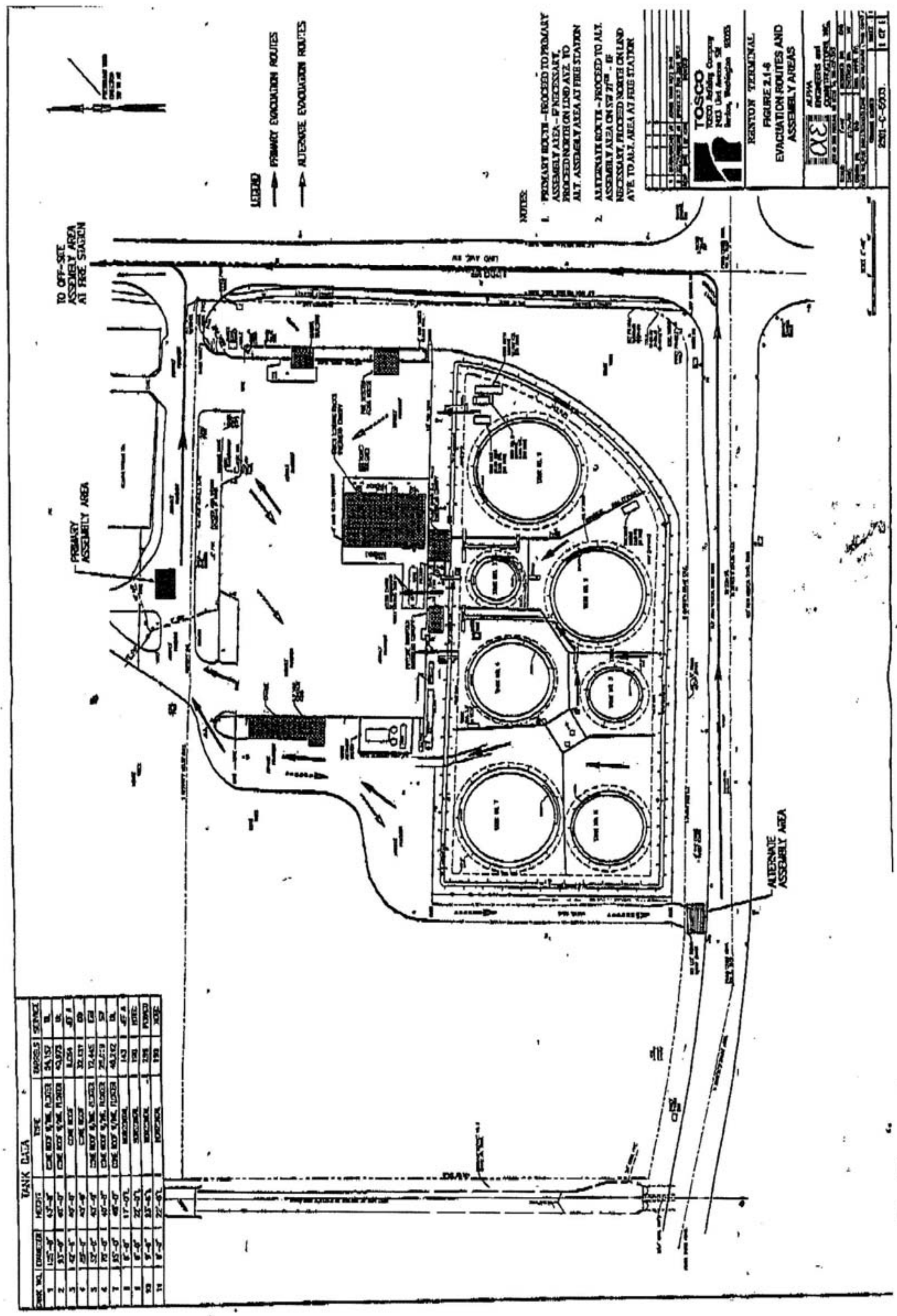
4. Provide medical assistance as necessary.

5. Shut off the electrical supply to the remediation equipment, if appropriate and safe to do so.

6. Notify the terminal manager that is on duty at (425) 228-6142 ext. 1.

7. Notify Renton project manager or principal at office of Acton Mickelson Environmental, Inc. at (916) 939-7550.

8. Acton Mickelson Environmental, Inc. project manager or principal will make appropriate notifications to ExxonMobil, regulatory agencies, and ConocoPhillips contacts.



DEC-19-2006 14:03 From:ACTON MICKELSON 3608836995 To:9163397570 P.2/2

ACTON • MICKELSON • ENVIRONMENTAL, INC.

CLASS III PETROLEUM SITE HEALTH AND SAFETY PLAN

Client ExxonMobil Corporation	AME Project No.13042.05
Site Name Conoco-Phillips (Renton) #46-080	Site Address 2423 Lind Avenue SW Renton, WA

Prior to initiating field activities, the Site Safety Officer must review the Site Health and Safety Plan (SHSP) with all members of the field crew. Each member must then sign and date a copy of the SHSP indicating they have reviewed and understand all aspects of the SHSP. This signed copy is returned to the project file upon completion of field activities.

SHSP's may be revised or rewritten for different phases of a project if site activities are distinctly different, if areas of differing hazard are involved, or as information about contaminants and hazards changes. Changing conditions may justify either tightening or loosening SHSP restrictions and action levels, depending upon the additional information provided.

SIGNATURES OR REVIEWERS/FIELD CREW: Signature indicates that this person has reviewed and understands all segments of the SHSP, agrees to abide by the SHSP safety rules and guidelines, and has received and completed the appropriate training as required by the SHSP.

Signature	Date

LOCAL EMERGENCY TELEPHONE NUMBERS (INCLUDE AREA CODES)

Ambulance	911
Hospital Valley Medical Center (see map)	911 or (425) 228-3450
Poison Control Center	911 or (800) 222-1222
Fire Department	911 or (425) 430-7000
Airport Seattle	NA
Police	911 or (425) 430-7500

NOTE: 911 is enhanced for Washington State

A. GENERAL INFORMATION

Client ExxonMobil Corporation	AME Project No.13042.05
Site Name Conoco-Phillips (Renton) # 46-080	Client Claim/P.O. No. 13042.05
Site Address 2423 Lind Avenue SW, Renton, WA	Project Manager Jim Twiford
Site Owner Conoco-Phillips	Terminal Manager John C. Parham
Plan Prepared By JRS	Date 5-19-06
Approved By	Date
Revised By DJS	Date 4-28-09
Revision Approved By	Date
Proposed Date of Investigation	Date

Objectives: Maintain and Operate remediation system and perform semi-annual ground water monitoring.

Proposed Date of Investigation Ongoing	

Hazard Summary/Level of Protection:

A ☐ B ☐ C ☐ D ☒ (with modifications--see Section D.1)

Summary of Available Information:
1. Site is an active bulk fueling terminal. The facility is an above ground fuel storage tank farm supplied by a main pipeline running directly under the site.

Sources of Background Information:

1. Previous regional and site investigations.

B. EMERGENCY INFORMATION

LOCAL EMERGENCY TELEPHONE NUMBERS (INCLUDE AREA CODES):

Ambulance	(911)
Hospital	(425) 228-3450
Poison Control Center	(911) or (800) 222-1222
Fire Department	(911) or (425) 430-7000
Airport	NA
Police	(911) or (425) 430-7500

NOTE: 911 in the state of Washington is enhanced.

SITE RESOURCES

Water supply available on site:	Yes ☒	No ☐
Telephone available on site:	Yes ☒	No ☐
Bathrooms available on site:	Yes ☒	No ☐
Other resources available on site	Yes ☒	No ☐

If yes, identify: Electricity

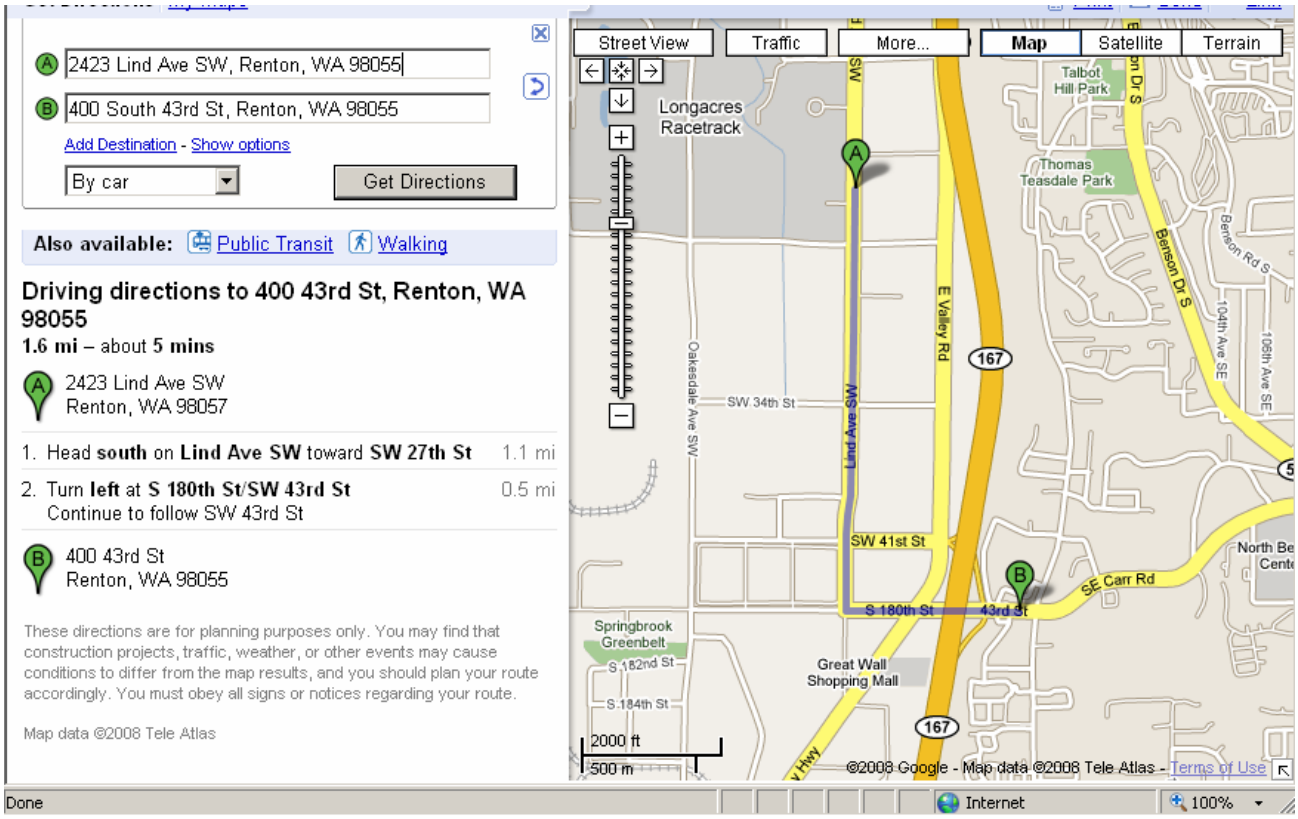
If you answered "no" to any of the above questions, identify the closest available facility and provide directions.

EMERGENCY CONTACTS	**Phone Number (include area codes)**	
	Work Phone	**Home Phone**
Project Manager Jim Twiford	(916) 939-7550	(916) 863-0966
Principal-in-Charge B. J. Mickelson	(916) 939-7550	(916) 939-5052
Health and Safety Officer M. A. Acton	(916) 939-7550	(530) 676-5343
Site Contact John C. Parham	(425) 228-6142 ext. 1	Conoco-Phillips
Jerome Cruz - WA Dept of Ecology	(425) 649-7000	(425) 691-8560
Dave Haberman – King Co. Indust. Waste Investigator	(206) 263-3000	( )
	( )	( )

C. EMERGENCY ROUTES

Give name, address, telephone number, directions, distance and time estimate, and map.

HOSPITAL: Go south (turn right out of facility) on Lind Ave. towards 27th street then turn left onto SW 27th street. Turn right onto E Valley road for one mile than turn left onto S 180th street which turns into S 43rd street SW. Look for Valley Medical Center at 400 43rd St. SEE ATTACHED MAP.



OTHER:_____

_____

_____

D. SITE/WASTE CHARACTERISTICS

Waste/Contaminant Type(s):	Liquid ☒ Soil ☐ Solid ☐ Sludge ☐ Gas ☐
Characteristic(s):	☐ Corrosive ☐ Ignitable ☐ Radioactive ☐ Unknown ■ Volatile ■ Toxic ☐ Reactive ☐ Other_ (Name)

Major Spills/Releases

Release Type	Date	Chemical	Quantity	Contaminated Media*
Unknown	Unknown			Soil, groundwater (possibly)

*Air, surface water, soil, or ground water.

Free Product: ☐ Yes ☒ No	Dissolved: ☒ Yes ☐ No

Have removal actions occurred? ☒ Yes ☐ No
If yes, describe: Remediation system installed late 1980's

Site Characterization: Monitoring Wells: 28

Description: Active ☒ Closed/Abandoned ☐

Site Activities (operations on site, products, raw materials used, etc.): The site is an active above ground fuel storage and bulk fueling terminal. A remediation system was installed in the late 1980's.

How many years has the site been operating? unknown	Was the site used by previous owners? ☒ Yes ☐ No

Describe previous site activity: Same use for previous owner

Surface cover on site includes:

☒ Soil/bare ground	☐ Clay caps	☐ Plastic cover
☐ Grass	☒ Paving/asphalt	☐ Water bodies
☐ Woods	☐ Swamp	☐ Brush/scrub
☒ Buildings	☐ Unpaved roads	☒ Other landscaping

Site surface area estimated at 295,000 square feet.

Percentage of surface area:

Paved	60 %
Vegetated	5 %
Bare soil	35 %
Under water	NA %

Potential for dust generation on site: ☐ High ☐ Medium ☒ Low

Any site access restrictions: ☒ Yes ☐ No

- ☒ Fenced/locked
- ☒ Posting (signs)
- ☐ Canopy with 16 foot clearance.

Is there evidence of public access to the site: ☐ Yes ☒ No

If yes, describe: _____

CHEMICALS/WASTE STORED ON SITE:

	Quantity	Size	Chemical
☐ Drums			
☒ Tanks	7 ASTs	Up to 3 million gallons	Gasoline, diesel, jet a, kerosene, fuel additives
☐ Vats			
☐ Surface Impoundments			
☐ Pits/Landfills			
☒ Other	Up to 4 carboys	5-gallon carboy	Redux 333 (refer to MSDS sheet)

Utilities Location/Ownership (electrical, gas, telephone, cable TV):
Olympic product conveyance pipeline located underneath western half of paved area

History (worker or non-worker injury; complaints from public; previous agency action): unknown

Have citizen complaints been filed regarding the site: ☐ Yes ☐ No

If yes, describe: unknown

Are regulatory agencies involved with the site: ☒ Yes ☐ No

If yes, are they: ☒ federal ☒ state ☒ local

REGULATORY CONTACTS

Name	Agency	Phone
Dave Haberman	King Co. Industrial Waste Investigator	(206) 263-3000
Jerome Cruz	WA Department of Ecology	(425) 649-7094 direct (425) 649-7000 main (425) 691-8560 cell

E. HAZARD EVALUATION

List all chemicals below that have been identified or are suspected on site and their maximum concentrations in soil/water. Information on hazardous properties is listed in the appendix. For chemicals not shown in the appendix, enter the hazardous property information in the spaces provided.

Chemical Name	PEL/TLV	Maximum Concentration in Soil	Maximum Concentration in Water	*Health Hazards/ Comments
Gasoline	300 ppm	Unknown	3,360,000 µg/l (ppb)	Carcinogen
Benzene	0.1 ppm	Unknown	21,000 (ppb)	Carcinogen
Toluene	100 ppm	Unknown	42,000 (ppb)	Toxic
Ethylbenzene	100 ppm	Unknown	8,900 (ppb)	Toxic
Xylenes	100 ppm	Unknown	26,000 (ppb)	Toxic
Diesel Fuel	None established	Unknown	460 (ppm)	Carcinogen
MTBE	40 ppm	Unknown	560 ppb	Toxic

*Refer to appendix for detailed Hazardous Property information.

P = results pending.

Potential Hazards (check boxes that apply to the site):

☐ Corroded containers	☐ Visible leachate	☐ Underground tanks
☐ Visible soil contamination	☐ Odors	☒ Surface tanks
☒ Observed free product	☐ Dust	☐ Observed tanks
☐ Open lagoons	☐ Open pits	☒ Truck traffic

☐ Air stack emissions	☐ On-site surface water contamination
☐ Visible on-site releases	☐ Off-site surface water contamination
☐ Visible off-site releases	☐ Interior building contamination
☐ Visible on-site erosion	☐ No obvious hazards

F. SITE SAFETY WORK PLAN

Team Members (list names)	Responsibility
Jim Twiford	Project Manager
Michael Acton	Site Safety Officer
Barbara Mickelson	Public Information
Dan Sweet / Jacob Clark	Field Team Leader

PERIMETER ESTABLISHMENT

Map/Sketch Attached: ☒ Yes ☐ No	Site Secured: ☒ Yes ☐ No
Perimeter Identified: ☒ Yes ☐ No	Zone(s) of Contamination Identified: ☐ Yes ☒ No

F1. PERSONAL SAFETY

Potential Hazards

Active bulk terminal - Truck traffic. Remediation equipment – moving parts & electricity

Site Entry Procedures: Check in and sign in at the office (via behind office parking). Obtain a Conoco-Phillips hot work permit/LOTO and/or develop a JSA (if required by task). Enter via the Conoco-Phillips entrance gate.

Personnel Protection:

Level of Protection: ☐ A ☐ B ☐ C ☒ D

Modifications:

1. All personnel must wear hard hat, safety shoes, safety/traffic vest, safety glasses, and/or face shield.
2. Neoprene gloves and tyvek/saranax suit should be worn if contact with contaminated water or soil is likely.
3. Hearing protection must be worn if noise levels prevent normal conversation at a distance of 3 feet. No smoking, eating, or drinking is allowed on site.
4. No personnel are to enter or approach any excavation area where there is a danger of wall collapse or confined space entry.
5. Respiratory protection is dependent on conditions listed in the next section.

SURVEILLANCE EQUIPMENT AND MATERIALS:

Instrumentation	Action Level	Action
Flame Ionization Detector (Micro FID)	5 units*	Level C, air purifying respirator with organic vapor cartridge.
Other (specify):		
Oxygen meter	<19.5% oxygen	Do not enter area of confined space.
Combustible gas meter (LEL)	>10% LEL >20% LEL	Eliminate all ignition sources. Reduce levels immediately or leave site.

*Method of Calculation:

- Known Chemical 1/2 x TLV = Level C - air purifying respirator
  5 x TLV = Level B - supplied air respirator
- Unknowns 5 x background or 5 units = Level C - APR with combination organic vapor/dust cartridges.
  10 x background or 10 units = Level B - supplied air respirator.

First Aid Equipment: Standard first aid kit, portable eye wash.

First Aid Procedures:

Ingestion: DO NOT induce vomiting, summon medical help.
Inhalation: Move victim to fresh air, seek medical attention if needed.
Dermal Exposure: Remove contaminated clothing, flush with water.

DECONTAMINATION PROCEDURE:

Level: A ☐ B ☐ C ☐ D ☒

Refer to Health and Safety Manual for detailed instructions.

Special Requirements: wash exposed skin with soap and water

WORK LIMITATIONS (time of day, weather, heat/cold, stress):

In high ambient temperatures, follow heat-stress precautions. Provide plenty of cool water and electrolytes (e.g., Gatorade). Remove protective clothing during breaks. Check resting pulse and increase number of breaks if pulse does not return to normal during work breaks.

In cold ambient temperatures (<0° F.), follow hypothermia precautions.

Work may progress only during daylight hours or under conditions of adequate lighting

ELECTRICAL HAZARDS:

Utilities located by Applied Professional Services, Inc. on 48 hour notice (date) before drilling.

Maintain at least 10 feet of clearance from overhead power lines. If unavoidably close to overhead or buried power lines, turn power off and lock out circuit breaker. Avoid standing in water when operating electrical equipment.

CONFINED SPACES:

If entry into confined space is necessary, an Entry Permit must be completed and authorized, and confined-space entry procedures followed.

G. SITE SKETCH

SEE ATTACHED

MATERIAL			
	Diesel Fuel	**Gasoline**	**MTBE**
Water Solubility[1]	Insoluble	Insoluble	4.8 %
Specific Gravity	.81 - 0.90	.72 - 0.76	0.74
Vapor Density	NA	3 - 4	NA
Flash Point, degrees F.	130	-45	-17
Vapor Pressure	NA	Variable	245mm
LEL/UEL	0.6 - 1.3 / 6 - 7.5	1.4% / 7.6%	1.6% / 8.4%
LD_{50}, mg/kg			4 gm/kg
TLV-TWA[7]	None established	300 ppm	40 ppm
IDLH Level	None established	None established	No info found
Odor Threshold or Warning Concentration, ppm	0.008	<1	No info found
Hazard Property[10]	BCD	BCD	BCD
Dermal Toxicity[11]	CI	CI	H
Acute Exposure Symptoms[12]	BCDHFKLMNP	BCEFHKLMNP	KLQ

MATERIAL			
	Benzene	**Ethylbenzene**	**Xylenes**
Water Solubility[1]	820 ppm	0.15g	0.02 %
Specific Gravity	.8765	0.867	0.088
Vapor Density	2.8	3.7	NA
Flash Point, degrees F.	12	59	81
Vapor Pressure	75 mm	7.1mm	7 mm
LEL/UEL	0.339 / 7.1	1% / 6.7%	0.9% / 6.7%
LD_{50}, mg/kg	3,800	3,500	50
TLV-TWA[7]	.1 ppm	100 ppm	100 ppm
IDLH Level	3,000 ppm	2,000 ppm	900 ppm
Odor Threshold or Warning Concentration, ppm	4.68	0.25 - 200	0.021 - 69
Hazard Property[10]	BCDG	BCD	BCD
Dermal Toxicity[11]	CGI	CIF	CI
Acute Exposure Symptoms[12]	BCDHFKLMNP	ABFHKLMNPQR	ABFHLMNQ

MATERIAL			
	Toluene		
Water Solubility[1]	0.05g		
Specific Gravity	.866		
Vapor Density	3.2		
Flash Point, degrees F.	40		
Vapor Pressure	22 mm		
LEL/UEL	1.3 / 7.1		
LD_{50}, mg/kg	5,000		
TLV-TWA[7]	100 ppm		
IDLH Level	2,000 ppm		
Odor Threshold or Warning Concentration, ppm	0.17 – 40 fatigue		
Hazard Property[10]	BCD		
Dermal Toxicity[11]	BHE		
Acute Exposure Symptoms[12]	BEFHKLMNOPQ		

HAZARDOUS PROPERTY INFORMATION

EXPLANATIONS AND FOOTNOTES

Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per million or part per billion level. Gasoline, for example, is insoluble in the gross sense, and will be found as a discrete layer on top of the ground water. But certain gasoline constituents, such as benzene, toluene, and xylenes will also be found in solution in the ground water at the part per million or part per billion level.

1. Water solubility expressed as 0.2 g means 0.2 grams per 100 grams of water at 20^{o} C.

2. Solubility of metals depends on the compound in which they are present.

3. Several chlorinated hydrocarbons exhibit no flash point in the conventional sense, but will burn in the presence of high energy ignition source or will form explosive mixtures at temperatures above 200^{o} F.

4. Practically nonflammable under standard conditions.

5. Expressed as mm Hg under standard conditions.

6. Explosive concentrations of airborne dust can occur in confined areas.

7. Values for Threshold Limit Value-Time Weighted Average (TLV-TWA) are OSHA Permissible Exposure Limits except where noted in Items 8 and 12.

8. TLV-TWA adopted by the American Conference of Governmental Industrial Hygienists (ACGIH), which is lower than the OSHA's Permissible Exposure Limit (PEL).

9. TLV-TWA recommended by the National Institute of Occupational Safety and Health (NIOSH). A TLV or PEL has not been adopted by the ACGIH or OSHA.

10. A – Corrosive
B - Flammable
C – Toxic
D – Volatile
E – Reactive
F – Radioactive
G – Carcinogen
H – Infectious

11. Dermal toxicity data are summarized in the following three categories:

a. **Skin Penetration**

A - Negligible penetration (solid-polar)
B - Slight penetration (solid-nonpolar)
C - Moderate penetration (liquid/solid-nonpolar)
D - High penetration (gas/liquid-nonpolar)

HAZARDOUS PROPERTY INFORMATION

EXPLANATIONS AND FOOTNOTES
(continued)

b. **Systemic Potency**

E - Slight hazard (LD_{50} = 500 - 15,000 mg/kg)
Lethal dose for 70 kg man = 1 pint to 1 quart

F - Moderate hazard (LD_{50} = 500 - 15,000 mg/kg)
Lethal dose for 70 kg man = 1 ounce to 1 pint

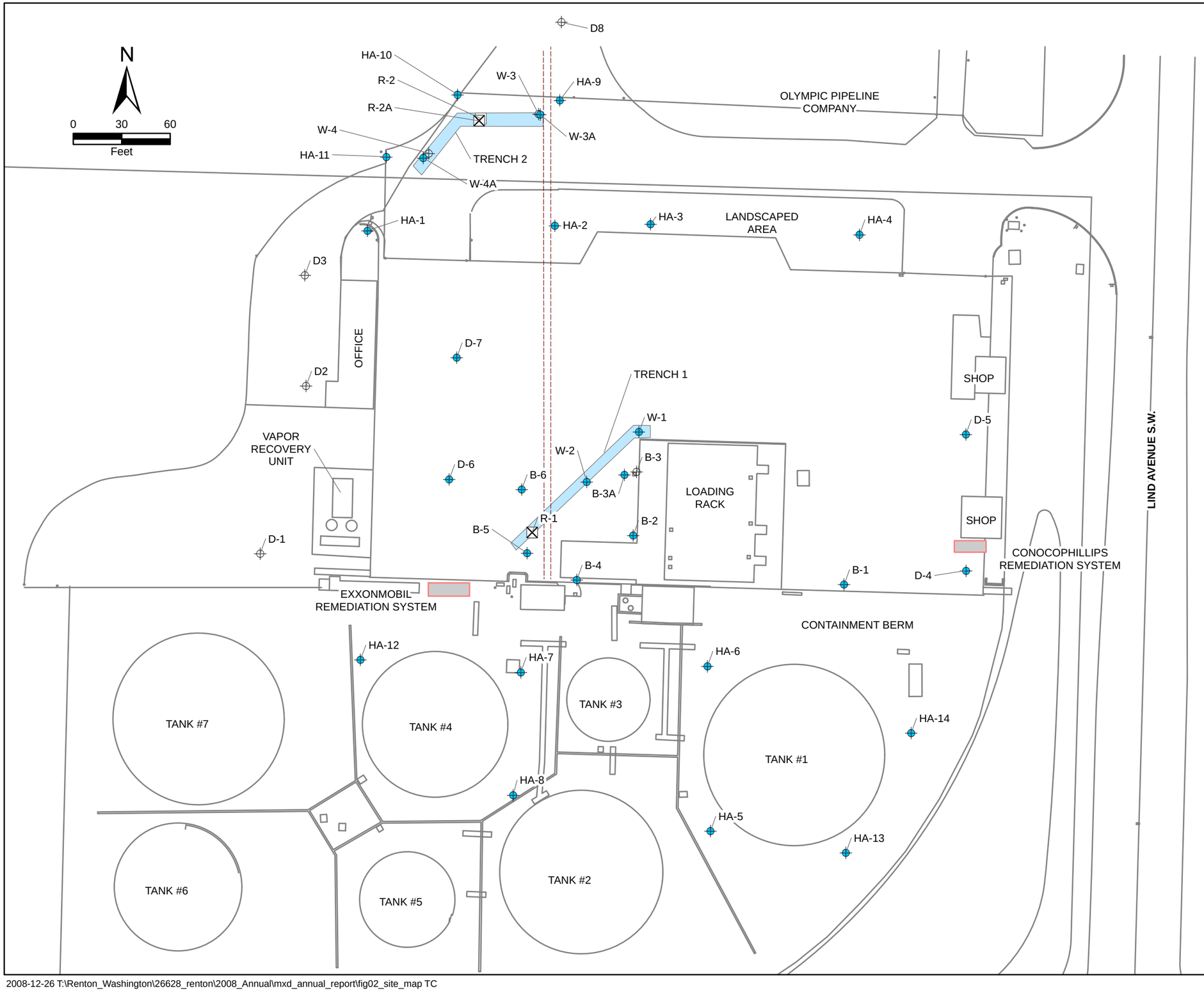
G - Extreme hazard (LD_{50} = 500 - 15,000 mg/kg)
Lethal dose for 70 kg man = drops to 20 ml

c. **Local Potency**

H - Slight = reddening of the skin
I - Moderate = irritation/inflammation of skin
J - Extreme = tissue destruction/necrosis

12. **Acute Exposure Symptoms**

A - Abdominal pains
B - Central nervous system
C – Comatose
D – Convulsions
E – Confusion
F – Dizziness
G – Diarrhea
H – Drowsiness
J – Fever
K – Headache
L – Nausea
M - Respiratory system irritation
N - Skin irritation
O – Tremors
P – Unconsciousness
Q – Vomiting
R – Weakness



LEGEND

- HA-1 — EXXONMOBIL MONITORING WELL
- R-1 — EXXONMOBIL RECOVERY WELL
- D-1 — MONITORING WELL ABANDONED OR NOT MONITORED
- R-2 — RECOVERY WELL ABANDONED OR NOT MONITORED
- OLYMPIC PIPELINE
- RECOVERY TRENCH
- REMEDIATION SYSTEM

Notes:
1. All locations and dimensions are approximate.
2. Base map information and monitoring well location survey data from Secor, 2007.
3. Monitoring well B-3 abandoned and monitoring well B-3A installed November 2007.
4. Monitoring well W-3, W-4, and recovery well R-2 abandoned and monitoring well W-3A, W-4A and recovery well R-2A installed December 2008.

FIGURE 1

SITE PLAN

FORMER MOBIL RENTON TERMINAL, RENTON, WASHINGTON

AME
Engineers and Earth Scientists
1107 Investment Blvd., #290, El Dorado Hills, California 95762 (916) 939-7550

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ATTACHMENT A

Traffic Control Plan & Traffic Control Process Flow Diagram

Identify which of the following Traffic Control Procedures applies to the work for this site.

A. Performing tasks in roadways:

- All employees are required to wear high-visibility clothing at all times while onsite.
- Review of site specific HASP should identify and require that the buddy system be implemented in areas considered high risk.
- Use of a minimum of 2 additional traffic control measures/devices.
- Lane closure procedures following appropriate regulatory standards (e.g. DOT/OSHA, National Highway Safety Uniform Traffic Control), local standards, or GR minimum standards.

B. Performing tasks in traffic areas (other than roadways) or any area where vehicular accidents could occur: (pump islands, parking lots/garages, up on curbed areas, in grass right of ways, etc.)

- All employees are required to wear high-visibility clothing at all times on site.
- Use of a minimum of 2 additional traffic control measures/devices.
- Review of site specific HASP should identify and require that the buddy system be implemented in areas considered high risk.

C. Long duration work (geoprobe operations, drilling, trenching, etc.):

In addition to standard practices for work in roadway and/or other traffic areas:

- Placement of cones and barricades as needed to protect the work area.
- Placement of flags as needed to protect the work area.
- Placement of "Men Working" sign for advance warning to motorists.

Which set(s) of procedures will be followed for this site?

A. Performing tasks in roadways
B. Performing tasks in traffic areas (but not in roadways).
C. Long duration work
D. Other (Describe)

Project Manager _____ **Date** _____

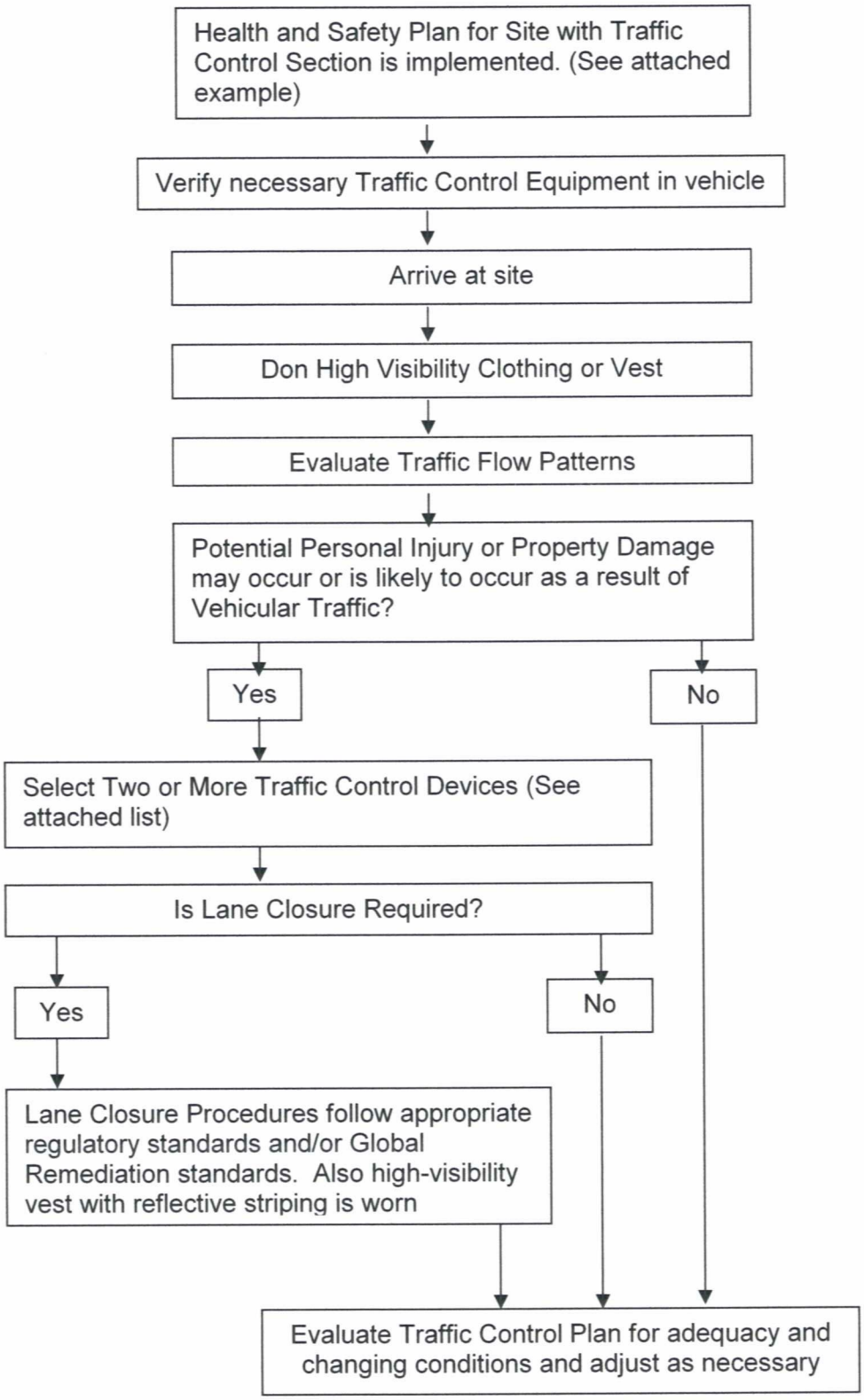
EXAMPLES OF PRECAUTIONARY MEASURES / CONTROLS

- Place wells in safe locations
- Be alert, pay attention, watch, and listen for cars
- Wear reflective vest and bright clothing
- Use cones at each point of service
- Place pole mounted warning flags inside of cones
- Park vehicle in order to block traffic
- Use flashing lights on barricades
- Use light bars or reflective lights on trucks
- Consult site manager about traffic – traffic evaluation
- Avoid prolonged time in traffic lanes
- Don't work around corners, make yourself visible
- Stay upright as much as possible
- Give notice to vehicle drivers nearby
- Trust no one, even if they see you
- Use buddy system
- Work during non-peak hours
- Always face traffic
- Use floodlights in darkness
- Obtain police assistance for roadwork and local permits as required
- Place letter on windshields to warn drivers – "CAUTION – Work area behind your vehicle"

EXAMPLES OF TRAFFIC CONTROL DEVICES

- Traffic Cones in combination with Standard Warning Flag. Total height at least 42in. (1m). 2 cones = Traffic Control Device
- 42in. (1m) Traffic Cone. 2 cones = Traffic Control Device
- Molded Plastic Barricades
- Type I and II Barricades
- Use of Vehicle to block traffic
- Use of light bars or reflective lights on trucks
- Buddy System
- Place letter on windshield to warn drivers-"Caution-Technician Working Behind Your Vehicle"
- Portable Gates
- Use of Floodlights in Darkness
- Placement of "Caution-Work Area" signs
- Plastic Channelizer (Orange Barrel)

TRAFFIC CONTROL PROCESS FLOW DIAGRAM



ATTACHMENT B

Subsurface Clearance Procedures and Checklist

ExxonMobil

Subsurface Clearance Procedure Checklist

Revision - 0

Date of Revision - 01/08/05

Site Identification: _____

Project Consultant/Contractor: _____

Sections: 1. Safety / 2. Preparation Tasks / 3. Mark-Outs (Page 1 of 3)

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
JSA's complete /compliant per LPS guidance. Worker's properly trained and briefed on potential site / work hazards and safety SPSA's conducted / planned for site/operation LPO's conducted / planned Morning Safety Meeting planned / completed				
HASP is available and all contractors and subcontractors are familiar with it.				
All applicable local, state and federal permits have been obtained.				
Site access / permission has been secured.				
Most recent as-built drawings and/or site plans (including UST, product and vent lines) obtained.				
Reviewed site information to identify subsurface structures relevant to planned site activities (easements, right-of-ways, historical plot plans, fire insurance plans, tank dip charts, previous site investigations, soil surveys, boring logs, aerial photographs etc.).				
Utility mark-outs have been performed by public utility company(s) Mark-outs clear / visible				
Subsurface structure mark-outs performed by private mark-out company. Mark-outs clear / visible				

Sections: 4. Initial Site Visit / 5. Selecting Ground Disturbance Locations

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
Location of all aboveground indicators of subsurface utilities/services that may be leading to or from buildings within the planned work area has been identified.				
Location of utility mark-outs by all utility companies previously contacted has been identified within required time period.				
Location of all subsurface structure mark-outs by private mark-out company has been identified within required time period.				
Location of area lights/signs and associated subsurface lines identified.				
Location of all phones and associated subsurface lines identified.				
Location of all drains and associated interconnecting lines identified.				
Location of all electrical junction boxes and associated interconnecting lines identified				
Location of all natural gas meters or connections and all interconnecting lines identified				

Sections: 4. Initial Site Visit / 5. Selection Ground Disturbance Locations (Page 2 of 3)

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
Location of all other utilities/services (including fire hydrants, on/below grade electrical transformers, splice cages, sewer lines, pipeline markers, cable markers, valve box covers, clean-outs / traps, sprinkler systems, steam lines (including insulated tanks that may indicate steam lines), and cathodic protection on lines/tanks) identified				
Dispenser pan inspected to determine piping materials and whether piping is rigid or flexible				
Location of tank field, observation wells, dispensers, vent stacks, UST fill points, and emergency shutoff switch has been identified.				
Orientation, arrangement, location, sizes, of tanks, STP and extractor covers identified. Burial depth of tank determined if relevant.				
Location of paving scars indicative of product lines or other subsurface structures identified.				
Presence of underground pipelines associated with pumps and pump galleries, manifolds, tank fields, compressors, production wells, loading racks and equipment identified.				
Presence of underground instrumentation cable runs, PLCs, remote instrumentation (process analyzers, CEMs), lines leading from/to MOVs etc inspected / identified.				
Presence and tracing of process/storm sewers identified / understood.				
Location of other pertinent features that may be of relevance to work scope has been identified.				
Existing remediation systems (above-ground components, well covers, new pavement/asphalt that may indicate subsurface piping, etc.) have been identified.				
All other pertinent surface features identified.				
Clearance methods approved by FM.				
Critical zones - 10 feet (3 meters) distance from edge of tank, pumps and pump galleries, manifolds, on/below grade transformers, compressors, production wells, loading racks, other process equipment, operating dispenser islands and suspected underground lines (and entire area between tank field and dispensers) have been identified. Identify critical zones in Comments section.				
Ground disturbance locations reviewed by PM.				

6. Subsurface Structure Delineation Activities (page 3 of 3)

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
HASP is available and all contractors and contractors are familiar with requirements.				
Subsurface Clearance Protocols have been reviewed with all site personnel involved in subsurface disturbance activities.				
Work area is secured. Site work permits have been obtained. Emergency shut-off switch is located. Fire extinguishers / warning signs are present. Other safety equipment as needed				
Required paving or surface improvement has been removed to allow clear visibility of subsurface conditions.				
If conducting borehole advancement activities: First 4 feet (1.2 meters), or deeper in areas where expected frost levels are greater than 4 feet, has been delineated utilizing most effective method (e.g. vacuum digging, probing, hand digging, etc.) Note methods used in Comments.				
If conducting borehole advancement activities in critical zones (and non-critical zones if possible): Second 4 feet (total of 8 feet (2.4 meters)) has been delineated. Note methods used in Comments.				
If conducting trenching/excavation activities in critical zone: First 4 feet (1.2 meters), or deeper in areas where expected frost levels are greater than 4 feet, assessed for below grade issues. Note methods used in Comments.				
If subsurface structures exposed, extra precautions have been taken to ensure structural integrity.				

Other Comments / Findings:

Completed by: _____
Name

Signature: _____ _____
Company Date

LIMITATIONS

The Subsurface Clearance Procedures set forth in this document are the suggested procedures but may not be applicable to particular sites based on the site-specific considerations. The Consultant is responsible for making a site-specific evaluation of each site to determine whether the Subsurface Clearance Procedures should be utilized or require modification. If safety or other site-specific considerations require a modified or different procedure, the Consultant should review the modified / different procedure with the GR Field manager (Global Remediation) in advance.

PURPOSE

To prevent injury to workers and damage to subsurface structures (including tanks, pipe lines, water lines, gas lines, electrical service, etc.) during ground disturbance activities (including drilling, augering, sampling, use of direct-push technologies, excavation, trenching, concrete coring or removal, fence post installation, grading or other similar operations).

SCOPE

This procedure provides minimum guidance for subsurface clearance activities, which must be followed prior to and during ground disturbance activities at any and all ExxonMobil Global Remediation project sites. However, even after completing the subsurface clearance activities required in this procedure, all ground disturbance activities should proceed with due caution.

Deviations from this procedure may be provided on an exception basis for specific situations, such as underground storage tank system removals, verified above ground/overhead services / lines, undeveloped land / idle facilities, shallow ground water conditions, soil stability, or well construction QA/QC concerns, etc.

The consultant/contractor must review deviations with the ExxonMobil Global Remediation Field manager (PM) before proceeding. In these instances the review must be documented in the case file.

The consultant/contractor is responsible for, and shall ensure that all ground disturbance activities are completed safely, without incident and in accordance with applicable federal, state and local regulations.

This **procedure** shall not override any site specific or consultant/contractor procedures that are more stringent or provide a greater degree of safety or protection of health or the environment.

APPLICABLE DOCUMENTS

- Frequently Asked Questions: Subsurface Clearance Procedure, Subsurface Surveys, Technologies, and Markout Companies (Best Net)
- Key Points on Underground Location Industry and Technologies (Best Net)
- Technical Report: Techniques and Technologies for Subsurface Line Location (Best Net)

APPLICABLE APPENDICES

- Subsurface Clearance Checklist
- Subsurface Mark-Out Technology Application Chart

RESPONSIBLE RESOURCES

CONSULTANT/CONTRACTOR

- The consultant/contractor will be responsible for fulfilling the objectives of this procedure by ensuring that the identified procedures are carried out by all of the consultant's/contractor's employees, sub-contractors, and any other person involved in this activity.
- The consultant/contractor will ensure that all individuals working on ExxonMobil Global Remediation projects are adequately trained and supervised.
- The consultant/contractor will practice safe and environmentally compliant investigation and drilling practices and employ all necessary measures to avoid damage to subsurface structures.
- The consultant/contractor is responsible for reviewing with PM all selected ground disturbance locations/areas, as well as the equipment/methods to complete the work.
- The consultant/contractor will ensure this subsurface procedure has been reviewed and is understood by all involved site personnel.

GLOBAL REMEDIATION PROJECT MANAGER

- The PM, or other ExxonMobil person designated by the PM (designated person), will be the point of contact for the consultant/contractor in the event an exception to this procedure is requested.
- The PM, or designated person, will be responsible for reviewing all selected ground disturbance locations/areas, including any relocations, as well as all equipment necessary for those activities.

PROCEDURES

Consultant/contractor must complete the Subsurface Clearance Checklist in conjunction with the following procedures. The checklist must be completed before initiating any ground disturbance activities. The completed checklist must be submitted to the PM and included in the project files.

1. Safety

A Health and Safety Plan (HASP) must be available onsite and followed by all contractors and subcontractors. ExxonMobil Global Remediation's Contractual Safety Requirements must always be followed.

All work areas shall be defined and secured with safety cones, safety tape, construction fence, other barriers, or signs as appropriate.

Site work permits must be obtained as required by site procedures. Based on site conditions or classification, the use of intrinsically-safe equipment may be required.

If applicable, the emergency shutoff switch, or other emergency equipment, shall be located and the consultant/contractor, employees, sub-contractors, and any other person involved in this activity must be familiar with its use.

To ensure the safety of all on-site personnel and subsurface structure integrity, consideration should be given to de-energizing and locking out selected site utilities or temporarily shutting down a portion of or the entire facility.

Most of devices used for subsurface cable / equipment / tank detection are not intrinsically safe / designed for use in explosive / flammable atmospheres**. Therefore, ensure proper monitoring / gas free testing is performed before use. For additional help contact business line or regional safety or industrial hygiene staff.**

2. Preparation Tasks

Objective: To gather all relevant information about potential subsurface structures prior to the actual site visit.

a. Obtain Permits and Site Access

The consultant/contractor is responsible for following all applicable laws, guidance and approved codes of practice; obtaining all necessary permits and utility clearances; and securing site access permission.

b. Obtain Historic Site Information

Obtain most recent as-built drawings and/or site plans (including underground storage tank (UST), product and vent lines) as available. NOTE: As-built drawings may not accurately depict the locations and depths of improvements and subsurface structures and should, therefore, not be **solely** relied upon.

The consultant/contractor should obtain any other site information such as easements, right-of-ways, historical plot plans, fire insurance plans, tank (dip) charts, previous site investigations, soil surveys, boring logs and aerial photographs, etc. as relevant to the planned ground disturbance activities.

Where applicable, the consultant/contractor should also contact personnel who may have historic site knowledge.

3. Mark-outs

Objective: To identify location of subsurface structures on surface.

The consultant/contractor must ensure that a thorough subsurface structure mark-out at the site is completed to locate electrical, gas, telephone, water, sewer, low voltage electric lines, product delivery pipelines and all other subsurface utilities/services.

- Where available public utility companies must be contacted to identify underground utilities.
- In addition, where available and warranted by site conditions, a private utility/pipeline mark-out company should be contracted to perform an electronic subsurface survey to identify the presence of suspected hazardous or critical underground utilities and subsurface structures. In some cases to also confirm public utility mark-outs in the vicinity of planned ground disturbance activities. (See Subsurface Mark-Out Technology Application Chart)

Consultant/contractor should review all available site plan subsurface information with private mark-out company to assist in locating utilities and other subsurface structures.

NOTE: Mark-outs may not accurately depict the exact locations of improvements and subsurface structures and should, therefore, not be **solely** relied upon.

Where possible, the consultant/contractor is encouraged to be on site at time of subsurface mark-outs. This is to ensure accuracy and understanding of subsurface structures identified and provides an opportunity to exchange information with mark-out company personnel regarding planned work activities.

Subsurface structures should be marked throughout the entire work area(s) with adequate materials (e.g. site conditions may require paint and tape/flags). Ground disturbance activities must be started within 30 days of mark-out, unless local ordinances specify a shorter time period. If activities are not started within required time period or markings have faded, mark-outs must be redone.

Consultant/contractor should record time and date of mark-out request and list all companies contacted by the service and confirmation number. This should be available for review on site and checked off after visual confirmation of markings.

4. Initial Site Visit

Objective: To compare the site plan to actual conditions based on information gathered in Procedures 2 and 3 above, to obtain additional site information needed and to prepare a vicinity map.

The consultant/contractor shall document all findings and update the site plan with this information and provide updates to PM. On third party sites, close coordination with the site owner's representatives for mark-outs, review of as-builts, and other information

reviews should be conducted prior to work. PMs are encouraged to provide updated as-built information to the respective Business Units.

In some regions it may be more effective and efficient to conduct the site visit at the same time the contractor and drill rig are mobilized to the site. The inspection should include the following activities and may include others as determined by the consultant/contractor and the PM:

a. Utilities

The consultant/contractor shall perform a detailed site walkthrough for the purpose of identifying all aboveground indicators of subsurface utilities/services that may be leading to or from buildings within the planned work area. The inspection shall include, but not be limited to, the following:

- Utility mark-outs
- Aboveground utilities
- Area lights/signs
- Phones
- Drains
- Junction boxes
- Natural gas meters or connections
- Other utilities including: fire hydrants, on/below grade electrical transformers, splice cages, sewer lines, pipeline markers, cable markers, valve box covers, clean-outs/traps, sprinkler systems, steam lines (including insulated tanks that may indicate steam lines), cathodic protection on lines/tanks
- Observe paving scars (i.e. fresh asphalt/concrete patches, scored asphalt/concrete)

NOTE: In many cases, the on-site location of low-voltage electrical lines and individual property water and sewer line branches may be approximated by using the following technique.

- Locate the entry/connection location at the facility building
- Attempt to identify utility connections for the mains (water, sewer, etc.) by locating clean-outs, valve manways, etc. The location/path of the utility is likely within the area between the main connection and the facility building connection. Subsurface electrical line locations from the facility building to signs, lamps, etc. can be estimated with the same process.

b. Product Systems

The consultant/contractor shall perform a detailed site walkthrough for the purpose of identifying all aboveground indicators of product systems within the planned work area.

- Speak with someone (e.g. retailer, field supervisor, person responsible for issuing permit, etc.) with historical site knowledge to gain information about the site (location of former tanks, lines, etc.).
-
- For UST systems:
- Inspect for the presence of a dispenser pan and determine piping materials and whether piping is rigid or flexible, as flexible-piping runs may not be straight between connection points.

- Visually inspect the location of the tankfield, observation wells, dispensers, vent stack(s), and UST fill points. Note the location of the emergency shutoff switch and become familiar with its use.
- Note the orientation, arrangement, location, and the size/capacity of the tanks and submerged turbine pump (STP) covers (associated with product lines) and extractor covers (associated with stage I/II vapor recovery). Determine the burial depth of the tank field to also estimate burial depth of product lines, etc.
- Observe paving scars that may indicate location of product piping or other subsurface structures.

For other sites (e.g., Refineries/Chemical Plants, Terminals, Bulk Plants, Exploration & Production Facilities):

- Inspect for the presence of underground pipelines associated with pumps and pump galleries, manifolds, tank fields, compressors, production wells, loading racks, underground valves and other process equipment types.
- Inspect for underground instrumentation cable runs, as well as process/storm sewers. Note location of all instrumentation, analyzers, and lines leading from/to motor operated valves etc.

c. Existing Remediation Systems

Visually inspect the location of aboveground components.

Note the locations of well covers, sparge points, etc.

Observe new pavement/asphalt that may give indications of subsurface piping that is connected to recovery/injection wells and the aboveground components.

Other Pertinent Features

Note any other pertinent features that may be of relevance to the planned subsurface ground disturbance activities (e.g. underground private pipelines marked by aboveground designators, covers not associated with known lines that may be associated with historical underground tanks, hydraulic lifts etc.).

5. Selection of Ground Disturbance Locations

Objective: To document, communicate and review the selected ground disturbance area locations.

a. Define 'Critical Zones'

The following minimum criteria should be applied to determine critical zones:

- 10 feet (3 meters) distance from the furthest edge of any tank, pump(s) and pump galleries, manifolds on/below grade transformers, compressors, production wells, loading racks, and other process equipment types.
- 10 feet (3 meters) distance surrounding dispenser islands.
- The entire area between the tank field and dispenser island(s) at retail sites.

- 10 feet (3 meters) distance from suspected hazardous or critical underground utilities and other subsurface structures.
-
- The size of the critical zone may increase based on site conditions such as soil type, slope stability factors, and depth of subsurface ground disturbance activities to ensure that subsurface structure integrity is maintained. Final critical zone determination shall be reviewed with the PM.
-
- Note: Lines that can be verified as de-energized via a formal lock-out / tag-out program, and/or if impacted do not present a safety, environmental, community, or operational concern (either onsite of offsite), may at the discretion of the PM be excluded from the critical zone determination.
-
- Regional / country / site specific modifications to the critical zone applicability can
- be requested by the PM/Area Manager through the management of change process.
-
- More restrictive measures shall supercede if required by regulation / business units.
-

b. Select Ground Disturbance Locations

The consultant/contractor should utilize the information collected to this point in combination with regulatory requirements and project objectives to select ground disturbance locations. Ground disturbance locations should also consider the location of overhead obstructions (e.g. power lines, etc.).

If possible, the consultant/contractor should avoid selecting locations within the critical zone.

c. Review Selected Locations with the PM

The consultant/contractor must review the selected ground disturbance locations with the PM.

THE CONSULTANT/CONTRACTOR MUST NOT PROCEED WITH THE SUBSURFACE ACTIVITIES UNTIL THE PLAN HAS BEEN DISCUSSED WITH THE PM . IF RELOCATION OF PLANNED SUB-SURFACE ACTIVITIES IS NECESSARY OUTSIDE OF PREVIOUSLY REVIEWED AND APPROVED LIMITS/AREAS, THE CONSULTANT/CONTRACTOR MUST CONTACT THE PM PRIOR TO PROCEEDING.

-

6. Subsurface Structure Delineation Activities

Objective: To delineate subsurface structures prior to ground disturbance activities in order to prevent potential worker injuries, product release and/or damage to those structures.

a. Supervision:

The consultant/contractor's on-site representative will be responsible for all ground disturbance activities and must have a copy of this procedure on-site.

ALL GROUND DISTURBANCE ACTIVITIES INCLUDING SURFACE REMOVAL WILL BE PERFORMED, OBSERVED OR SUPERVISED BY THE CONSULTANT/CONTRACTOR'S REPRESENTATIVE AT ALL TIMES. This representative will ensure that the work is performed with due caution and will be alert for warning signs that could indicate the presence of underground tanks, utilities, product lines, or other subsurface structures. If any such indications arise, **THE WORK SHOULD IMMEDIATELY STOP IN THIS AREA AND THE PM SHALL BE CONTACTED IMMEDIATELY.** The consultant/contractor may proceed with other pre-assigned work at other locations on the site.

The consultant/contractor will ensure that all workers involved with subsurface ground disturbance activities have undergone appropriate training prior to working at an ExxonMobil Global Remediation site. At retail sites, ExxonMobil UST system training must also be completed.

b. Ground Disturbance Activities Sequence

If possible, ground disturbance activities should be planned such that the activities furthest from any suspected underground improvements are carried out first. This is done to determine the natural subsurface conditions and to allow the consultant/contractor to recognize fill conditions.

c. Warning Signs

The following warning signs may indicate the presence of a subsurface structure:

- Warning Tape (typically indicative of underground services)
- Pea Gravel/Sand/Non-indigenous Material (typically indicative of tanks or lines)
- Red Concrete (typically indicative of electrical duct banks)
- The abrupt absence of soil recovery in the hand auger. This could indicate pea gravel or sand that has spilled out of the auger. Except in areas where native soil conditions typically result in poor hand auger recoveries.
- Any unexpected departure from the native soil or backfill conditions as established in other onsite digging.

IF ANY OF THE ABOVE WARNING SIGNS OR A SUSPICIOUS CONDITION IS ENCOUNTERED, WORK IN THIS AREA SHOULD IMMEDIATELY STOP AND THE PM SHOULD BE CONTACTED.

d. Surface Removal for Paved Areas

Paving Removal

Sufficient paving or surface improvement should be removed to allow clear visibility of the subsurface conditions during clearance activities. Ground disturbance activities in an area of known subsurface structures may warrant a larger pavement opening.

- Monitoring Well Installations: 2 feet x 2 feet (60 cm x 60 cm) or 2-foot diameter minimum removal is suggested.
- Soil Borings/Push Type Samplers: 8 inches x 8 inches (20 cm x 20 cm) or 8-inch diameter minimum removal is suggested.
-
- NOTE: Coring and jack hammering should not take place directly over the location of known utility or subsurface structures / lines.

Surface Removal Technique

The technique used should not pose a threat to subsurface structures. Avoid use of heavy equipment if possible. In situations where heavy equipment must be used, additional precautions should be taken because subsurface structures could be located immediately below surface pavement.

e. Subsurface Delineation

The method used to delineate the subsurface should be compatible with the inherent associated risk given the type of facility/property, soil stratigraphy, and the location of the ground disturbance activity, such that the required delineation is obtained.

Subsurface Clearance Methods

The consultant/contractor should discuss clearance methods with the PM prior to start of field activities.

- Vacuum Digging - Soil should be broken up with an air lance and simultaneously vacuumed to remove loose soils. Alternatively a low volume/high pressure water lance may be used to break-up cohesive/dense soils while to vacuuming. Current test/experience indicates that water lances operating at pressures below 5,000 psi and at rates below 12 gpm are unlikely to damage typical fiberglass / metal lines/tanks and utilities. Using systems above these ranges should be tested prior to use.
- Probing - The probe should have a blunt or rounded tip and should be advanced by hand without excessive force. It is important to inspect the probe to ensure the tip is rounded and does not present a point/jagged cutting edge that could damage underground structures.
- Hand Digging - Should be performed with a small shovel.
- Hand Augering - The auger is to be turned slowly and not forced through the soil. It is recommended that an auger without sharp points (some augers have rounded edges) be used.
- Post-Hole Digging - A post-hole digger can be used for soil removal only in soil that has been probed by the 4 methods noted above, and cannot be used to advance the hole depth or width.
- An evaluation of sample collection requirements needs to be integrated into the selection of subsurface clearance methods to ensure sample integrity is maintained. For vacuum digging, with or without air lances the following guidance is provided:
- Loose sand soil - Vacuum lift only
- Tight dense sandy soils - Vacuum and air lance
- Dense cohesive soils - Vacuum and water lance
-
- Note: For retail sites, probing is required prior to hand augering or digging can be advanced only to the depth that has been probed.
-
- An evaluation of potential electrical or fire / explosion risks should be part of the overall sub-surface clearance job safety analysis to evaluate whether the use of non-conductive materials and/or non-sparking materials is warranted. (example: glass fiber handle on shovels or thick electrically insulating rubber grips on hand-auger or

probe). The use of non-conductive materials, electrical safety insulated gloves and footwear should also be evaluated. It is beyond the scope of this document to cover electrical / fire safety or protective equipment evaluation, selection, training and/or inspection methods. This should be part of the site safety program.

Subsurface Clearance Procedures Based on Planned Subsurface Ground Disturbance Activities:

Selected subsurface clearance methods that will achieve the highest level of precautionary investigation and/or safety based on site conditions should be reviewed with the PM prior to implementation.

(1) Drilling, Direct-Push Technologies, Augering, Fence Post Installation or Other Borehole Installation Activities:

- IN CRITICAL ZONES, A MINIMUM DELINEATION TO A DEPTH OF 8 FEET (2.5 METERS) IS REQUIRED.
-
- IN NON-CRITICAL ZONES, A MINIMUM DELINEATION TO A DEPTH OF 4 FEET (1.2 METERS) IS REQUIRED. IN AREAS WHERE EXPECTED FROST LEVELS ARE GREATER THAN 4 FEET, A GREATER DELINEATION DEPTH WILL BE REQUIRED.

The First 4 feet (1.2 meters)

The area to be delineated shall exceed the diameter of the largest tool (drill auger, push type sampler, ream, or similar mechanical equipment) to be advanced and sufficiently large to allow for visual inspection of any obstructions encountered.

The first 1 foot - 2 feet (0.3 meters - 0.6 meters) can be delineated by hand digging to remove the soil.

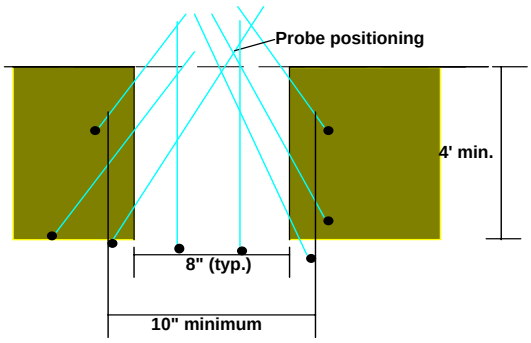
Next, delineate the area to ensure that no obstructions exist anywhere near the potential path of the mechanical equipment by probing / augering / vacuum digging or hand digging. Delineation shall extend as far laterally as possible and to a depth of 4-feet.

The Second 4 feet (1.2 meters)

Critical Zones
For boring locations inside the critical zone, delineation, utilizing one of the four methods described above, to an additional 4 feet (1.2 meters) is required.

Non-critical Zones
For sub-surface work outside the critical zone, delineation, of an additional 4 feet (1.2 meters) may be prudent due to site conditions / climate (deep frost-line) etc. but is not required.

Probing Example



NOTE: Not drawn to scale.

(2) Trenching/Excavation Activities:

- IN CRITICAL ZONES, A MINIMUM DELINEATION TO A DEPTH OF 4 FEET (1.2 METERS) IS REQUIRED. IN AREAS WHERE EXPECTED FROST LEVELS ARE GREATER THAN 4 FEET, A GREATER DELINEATION DEPTH WILL BE REQUIRED.
- The first 4 feet (1.2 meters) should be delineated by hand digging to remove the soil unless an alternative delineation method has been reviewed with the PM.
- Outside the critical zone, site-specific conditions will determine the appropriate course of action and delineation requirements must be reviewed with the PM prior to start of ground disturbance activities.

Appropriate subsurface clearance methods should be conducted along the length and width of the excavation at a frequency sufficient to ensure adequate precautions have been applied to the entire work area. The frequency and density of investigations shall be based on site knowledge, potential hazards and risks of the site / work area and surrounding locations (e.g. proximity to residential areas, public, etc.).

Whenever subsurface structures are exposed, work in area must cease until precautions (e.g. flags, cross bracing, stakes, etc.) are taken to ensure that the integrity of those structures is maintained during the trenching/excavation and subsequent backfilling activities.

A minimum 2-foot buffer zone must be maintained around exposed lines. No mechanical equipment may enter the buffer zone.

f. Alternative Subsurface Clearance Methods

In all cases the consultant/contractor must employ all means necessary to prevent damaging subsurface structures. Where natural subsurface conditions (e.g. cobbles/rocks, fill material, and/or bedrock) prevent adequate delineation utilizing

methods identified above, the consultant/contractor must employ an effective and innovative alternative method of delineation following review with the PM.

Additionally, the depth of utility clearances may require modification based on regional / site construction details. Less restrictive methods should follow management of change procedure to ensure proper documentation and approvals are provided.

g. Incident Notification

IF ANY PORTION OF A TANK, LINE, UTILITY OR OTHER SUBSURFACE STRUCTURE IS ENCOUNTERED AND THERE IS REASON TO BELIEVE THAT IT HAS BEEN DAMAGED, THE WORK IS TO CEASE IN THAT AREA AND THE PM MUST BE NOTIFIED IMMEDIATELY. IF APPLICABLE, THE EMERGENCY SHUTOFF SWITCH SHOULD BE ACTIVATED. THE PM WILL DECIDE IF ADDITIONAL UNCOVERING BY HAND IS REQUIRED. IF IT IS CONFIRMED THAT AN ACTIVE UST SYSTEM HAS BEEN DAMAGED, A TIGHTNESS TEST(S) WILL BE PERFORMED. UNDER NO CIRCUMSTANCES IS THE AREA TO BE BACKFILLED WITHOUT NOTIFYING THE PM AND RECEIVING AN APPROVAL TO PROCEED.

h. Scheduling

As subsurface delineation may be time consuming, it may be appropriate to perform the surface removal and subsurface delineation in advance of planned subsurface ground disturbance activities. If these activities are conducted in advance, the clearance holes must be adequately covered with plates and/or backfilled. Care must be taken to prevent settlement of the material used to cover/backfill the holes.

For remote, idled, or access controlled sites, clearance holes can be left open; however, hazard cones, fencing or other methods shall be used to identify the hazard.

i. Waste Disposal

The consultant/contractor is responsible for coordinating the final disposition, including transportation of generated soil and water wastes per prevailing regulatory requirements and ExxonMobil Global Remediation guidelines.

Subsurface Mark-out Technology Application Chart

Technology ⇒ **Object ⇓**	Electro-Magnetic Detector	Ground Penetrating Radar (GPR)⊙	Acoustic Plastic Pipe Locator	Probe, Beacon, Sonde, or Trace Wire	Cesium MagnetometerΞ
Power/Instrument Line (Energized/Signaled□)	❋ G	Y	R	R	Y
Power Line (Non-energized)	Y	❋ Y	R	R	Y
Sewer/Water Line (Metallic)	❋ G	>12" diameter G <12" diameter Y	Y	G	Y
Sewer/Water Line (Non-metallic)	R	>12" diameter G <12" diameter Y	G	❋ G	Y
Instrument/Telecomm Lines (Non-energized)	R	R	R	R	R
Natural Gas Line (Pipeline)◆	❋ G	>12" diameter G <12" diameter Y	R	R	G
Metallic/Non-Metallic Line (w/Tracer Wire)	❋ G	>12" diameter G <12" diameter Y	Y	Y	Y
Metallic/Non-Metallic Line (w/o Tracer Wire)	R	>12" ❋diameter G <12" ❋ diameter Y	Y	Y	R
Metal UST	❋ G	❋ G	R	R	G
Fiberglass UST	R	❋ G	R	R	Y

Additional Considerations

Technology ➡ **Variable** ⬇	Electro-Magnetic Detector	Ground Penetrating Radar (GPR)⊙	Acoustic Pipe Locator	Probe, Beacon, Sonde, or Trace Wire	Cesium MagnetometerΞ
Moist Soil	G	Y	G	G	Y
Dry Soil	Y	G	Y	G	G
Clay	Y	R	G	G	Y
Concrete w/Rebar	R	Y	G	G	R
Long Horizontal Profile	G	G	G	G	G
Short Horizontal but Deep Vertical Profile	Y	G	R	R	G
Access to Line✚	G	N/A	G	G	N/A
No Access to Line✚	Y	G	R	R	G
Ferrous Metal	G	G	G	G	G
Non-ferrous Metal	Y	G	G	G	Y

Each remediation site / project may have unique conditions, therefore do not use this chart as the sole decision criteria for technology selection. Use the chart as a starting point to assess <u>available</u> technology(s) applicable.

❋ **Indicates Best Technology for Given Object. <u>Site structures, rebar in concrete, etc. can significantly affect performance and reliability of any electro / magnetic method.</u>**

□ **Metallic lines that have power running through them or can be connected to a tracer signal generator.**

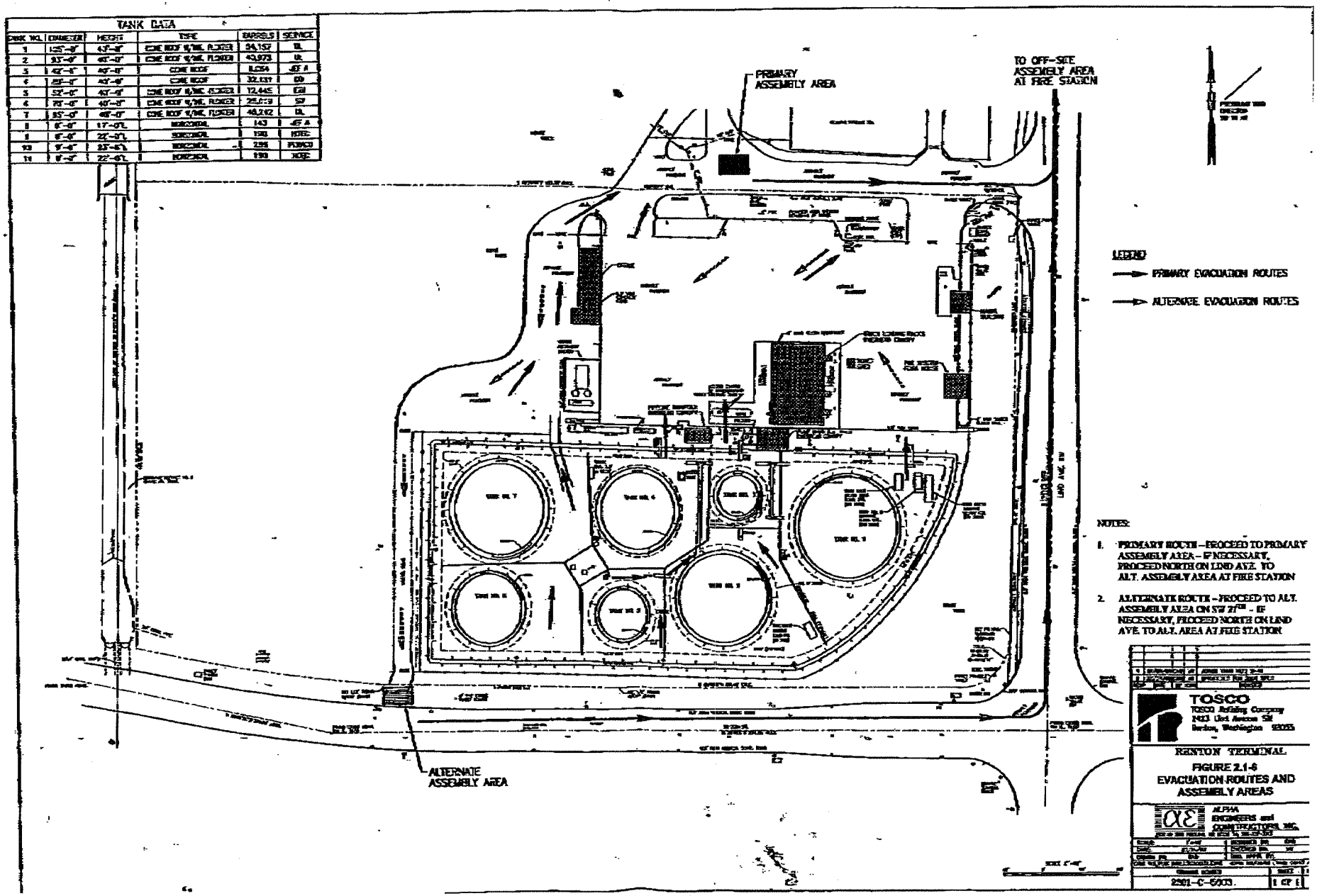
◆ **Natural gas pipeline locating technicians must be trained/certified in the US requires DOT, Office of Pipeline Safety standards, other regions may have similar certification or requirements.**

⊙ Most sensitive to interpretation; the skill, training, and experience of operator are critical.
Ξ Emerging technology with limited availability.
✚ Access: induce unique electronic signature, apply acoustical impulse, or insert probe/beacon/sonde.

Green: - Generally, an applicable technology,
Yellow: - May or may not be applicable,
Red:- Not generally applicable.

ATTACHMENT C

Emergency Response Plan



ATTACHMENT D

Job Safety Analysis Sheets

JOB SAFETY ANALYSIS FORM

Job Title: Anchor Installation	**Location:** Former Mobil Terminal, 2423 Lind Ave. SW Renton, Washington	**Page** 1 of 1
Equipment: Rotohammer, Hammer, Bolts, Washers, Anchors	**Supervisor:** Jim Twiford	**Analysis By:** Jacob Clark, Zach Guthmiller

Required Personal Protective Equipment:

Hard Hat	**Reflective Traffic Vest**	**Slip Resistant Steel Toed Boots**
Safety Glasses	**Cut-Resistant Work Gloves**	**Air Monitoring Instruments**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Survey work area for safe conditions	1a) Possibility of hazardous atmosphere.	1a) Check atmosphere with FID. a) Complete EMES daily permit and contact supervisor.
2) Setup rotohammer, extension cord(s), and install drill bit	2a) Possible hand injury during setup and while installing drill bit. b) Possible electrical hazard from powered equipment. c) Trip hazard from extension cord. d) Muscle strain.	2a) Wear cut-resistant work gloves during setup. a,b) Check that the extension cord is disconnected before installing or replacing drill bit. c) Run extension cords to avoid walkways and tie off cords to avoid trip hazards. d) Use proper lifting technique when setting up equipment.
3) Drill holes for supports into asphalt or concrete	3a) Hand or eye injury from flying debris and dust while using rotohammer. b) Muscle strain. c) Damage from drilling into underground lines. d) Electrical shock. e) Trip slip or fall.	3a) Wear safety glasses and work gloves. a,b) Do not apply extra weight to rotohammer, allow rotohammer to proceed slowly. b) Maintain proper body position. c) Do not install supports in areas under which conduit or other piping run. c) Drill a maximum depth of 3 inches to make sure no underground lines are contacted by drill bit. d) Use a GFI receptacle and unplug when drilling complete. d,e) Disconnect and remove roto hammer when drilling is complete. d,e) Remove extension cord if no longer needed.
4) Clean out the hole, using wire brush, compressed air, or vacuum	4a) Hand or eye injury from debris and dust generated by rotohammer. b) Back or muscle strain. c) Trip slip or fall.	4a) Wear safety glasses and work gloves. b) Maintain proper body position. c) If using a wire brush, remove extension cord from work area. c) If using compressed air or vacuum, run extension cord as recommended in 1c. c) Remove extension cord if not already removed.
5) Push anchor in hole with bolt in anchor	5a) Pinch hazard for hands. b) Possible damage to anchors and threads.	5a) Keep fingers away from anchor while using hammer. b) Do not force anchor to the point of damage. b) Use a washer to keep anchor from sinking in hole.
6) Check that all tools, trash, and equipment have been picked up and work area is left in a clean and safe manner	6a) Slip, trip, or fall b) Muscle Strain from lifting heavy object	6a) Double check work area to ensure that all tools, equipment and trash has been removed. b) Bend at the knees, and lift with the legs.
COMMENTS:		

JOB SAFETY ANALYSIS FORM

Job Title: Filter Housing Install	**Location:** Former Mobil Terminal, Renton, WA	Page 1 of 1
Equipment: Filter housings, general tools, PVC glue and primer	**Supervisor:** Jim Twiford	**Analysis By:** Dan Sweet

Required Personal Protective Equipment:

Hard Hat	**Traffic Vest**	**Slip Resistant Steel-Toed Boots**
Safety Glasses	**Work Gloves (cut-resistant)**	**Air Monitoring Instruments**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Movement into and out of treatment system area over concrete containment berms and over unimproved and uneven ground surface; set-up for work.	1a) Slip, trip, fall hazard. b) Back strain from carrying tools and equipment.	1a) Make sure a clear path exists before moving around treatment system. a) Watch path while walking. b) Use proper lifting techniques; lift with legs, not with back.
2) Survey work area for safe conditions.	2a) Possibility of hazardous atmosphere. b) Hazards from improper housekeeping.	2a) Check atmosphere in equipment enclosure with FID. b) Complete EMES daily permit and contact supervisor.
3) Apply lock out/tag out to system.	3a) Possible injury / equipment damage.	3a) Refer to section 7 of the O&M manual for detailed LOTO procedures. a) Complete EMES daily permit including LOTO section.
4) Remove existing housing and associated piping.	4a) Possible hand injury from saw or reciprocating saw. b) Pinch hazard from wrench usage. c) Back strain from removing old housing.	4a) Keep hands away from saw blade. Secure pipe before cutting with saw. a) Wear cut-resistant work gloves. b) Position wrench to avoid pinch hazards. c) Lift with the knees, not with the back.
5) Cut new PVC piping to appropriate lengths.	5a) Possible hand injury from saw or reciprocating saw.	5a) Keep hands away from saw blade. Secure pipe before cutting with saw. a) Wear cut-resistant work gloves.
6) Install new housings, associated piping and pressure gauges.	6a) Back strain from installing new housings. b) Inhalation of PVC glue and primer vapors. c) Pinch hazard from wrench usage.	6a) Lift with the knees, not with the back. b) Do not breath vapors directly and keep pipe at arm's length away from nose and mouth. c) Position wrench to avoid pinch hazards.
7) Trace process piping along with P&ID to check installation and valve positions.	7a) Possible equipment damage.	7a) Check that installation is correct and that LOTO is ready to be removed. a) Call supervisor with any questions.
8) Remove lock out/tag out to energize system.	8a) Possible injury / equipment damage.	8a) Refer to section 7 of the O&M manual for detailed LOTO procedures.

JOB SAFETY ANALYSIS FORM

Job Title: Ground Water Bag Filter Changeout	**Location:** Former Mobil Terminal, 2423 Lind Ave SW Renton, WA	Page 1 of 1
Equipment: Replacement bag filters, metal buckets	**Supervisor:** Jim Twiford	**Analysis By:** Dan Sweet

Required Personal Protective Equipment:

Hard Hat	**Traffic Vest**	**Slip Resistant Steel-Toed Boots**
Safety Glasses	**Air Monitoring Instruments**	**Work Gloves (cut-resistant and nitrile)**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Movement into treatment system area over concrete spill-containment berms, conduit and/or uneven ground surface; set-up for work.	1a) Slip, trip, fall hazard.	1a) Make sure a clear path exists before moving around treatment system. a) Watch path while walking.
2) Survey work area for safe conditions.	2a) Possibility of hazardous atmosphere. b) Hazards from improper housekeeping.	2a) Check atmosphere in equipment enclosure with FID. b) Complete EMES daily permit and contact supervisor.
3) Shut down system.		3a) Refer to section 9.2 of the O&M manual for instructions.
4) Apply lock out/tag out to system.	4a) Possible injury / equipment damage.	4a) Refer to section 7 of the O&M manual for detailed LOTO procedures. a) Complete EMES daily permit including LOTO section.
5) Close isolation valves V-244A, V-244B, V-252A and V-252B, and then open bypass valve V-247	5a) Possible injury / equipment damage.	5a) Verify that water lines are not under pressure by checking PI-245A, PI-245B, PI-251A and PI-251B.
6) Remove filter housing lid and remove old filter.	6a) Contact with contaminated water. b) Spill hazard.	6a) Wear nitrile gloves to handle old filters. b) Have 5-gallon metal bucket on hand to store used filters.
7) Install new filter and replace filter housing lid.	7a) Contact with contaminated water. b) Equipment damage / malfunction.	7a) Wear nitrile gloves to install new filters. b) Check filter installation for proper placement before replacing housing lid. c) Check rubber seal on housing lid for dirt or debris prior to replacement of housing lid.
8) Open isolation valves V-244A, V-244B, V-252A and V-252B, and then close bypass valve V-247	8a) Possible injury / equipment damage.	8a) Verify that valves are open by checking PI-251A and PI-251B for an increase in pressure.
9) Remove lock out/tag out to energize system.	9a) Possible injury / equipment damage.	9a) Check filter for proper orientation. a) Refer to section 7 of the O&M manual for detailed LOTO procedures.
10) Restart system.		10) Refer to section 9.1 in the O&M manual for detailed instructions.

JOB SAFETY ANALYSIS FORM

Job Title: Water Level and LPH Measurements	**Location:** Former Mobil Terminal 2423 Lind Ave. SW, Renton, WA	**Page** 1 of 1
Equipment: Hand tools, water level meter, air quality monitor, truck	**Supervisor:** John Shaal	**Analysis By:** Brian Richardson

Required Personal Protective Equipment (PPE):

Hard Hat **Cut-Resistant Work Gloves** **Slip-Resistant Steel-Toed Boots**
Safety Glasses **Nitrile Gloves** **Traffic Vest**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Mobilization to Well Location	1a) Vehicle collisions b) Vehicle striking worker(s)	1a,b) Assess overall traffic level; demobilize if excessive. a,b) Use truck as barrier, set up cones or other traffic control devices per SHSP. a,b) Stand/kneel facing traffic.
2) Stage Equipment (Hazards and Recommended Actions Apply to All Job Steps)	2a) Slip, trip, or fall b) Back strain	2a) Keep work area free of obstructions (stage equipment to one side of well, minimum 2-foot distance from step and work area). b) Bend at knees.
3) Access and Open Well Box	3a) Hand or finger injury from sharp edges on tools, scraping against ground surface, or pinch point with well lid b) Harmful vapors c) Biological hazards	3a) Use proper tools and wear cut-resistant work gloves. a) Do not position fingers under well lid. b) Test HC concentrations around well box and in well box. c) Inspect well box, clean with wirebrush or other tool as warranted (with protected hands).
4) Access and Open Well	4a) Hand or finger injury from scraping or bumping against inside of well box b) Flammable gases	4a) Properly loosen well cap, wear work gloves. b) Test HC concentrations around well box and in well box.
5) Lower and Retrieve Interface Probe to Obtain Water Level and LPH Measurement	5a) Skin or eye contact with impacted waters 5b) Release of impacted water and/or LPH 5c) Cross-contamination of wells	5a) Wear safety glasses and nitrile gloves. 5b) If LPH is encountered, transfer probe to a container to decontaminate. 5c) Measure points historically having LPH last. 5c) Decontaminate thoroughly after use.
6) Secure Well and Well Box	6a) Hand or finger injury from sharp edges on tools, scraping against inside of well box or ground surface, or pinch point with well lid.	6a) Use proper tools and wear cut-resistant work gloves. a) Do not position fingers between well lid and well box ring.
7) Clean-up and Wrap-up	7) Same as steps 1) and 2)	7) Same as steps 1) and 2)
COMMENTS:		

JOB SAFETY ANALYSIS FORM

Job Title: Submersible Pump Removal	**Location:** Former Mobil Terminal, Renton, WA	Page 1 of 1
Equipment: Hand Tools	**Supervisor:** John Shaal	**Analysis By:** Brian Richardson

Required Personal Protective Equipment:

Hard Hat **Traffic Vest** **Gloves (Nitrile, Leather, and Kevlar)**
Safety Glasses **Slip Resistant Steel Toed Boots**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Mobilization to well location.	1a) Vehicular traffic.	1a) Drive defensively and yield to site traffic. a) Position vehicle for protection while working at well. a) Check for traffic before exiting vehicle and wear traffic vest.
2) Accessing well box.	2a) Vehicular traffic. b) Pinch, cut, or abrasion when using hand tools. c) Organic vapors. d) Slip, trip, or fall.	2a) Set up traffic delineators. a) Kneel facing predominant traffic. b) Wear leather work gloves. b) Use proper tools, work gloves. c) Check atmosphere in well box and well head space using FID or LEL meter. d) Keep work area clear; place well lid and bolts out of work area (e.g., under vehicle).
3) Disconnect power and control wiring from control panel.	3a) Electrical shock hazard. b) Pinch, cut, or abrasion when using hand tools.	3a) Open operation and maintenance manual and follow lockout/tagout procedures. b) Use correct tool(s) for the task and use tool(s) properly.
4) Disconnect conveyance hose from downhole hose.	4a) Pinch, cut, or abrasion when using hand tools. b) Contact with hydrocarbon-impacted ground water.	4a) Use correct tool(s) for the task and use tool(s) properly. a,b) Wear nitrile gloves and leather work gloves. b) Wear safety glasses. b) Break connections slowly to minimize possible spray of pressurized ground water.
5) Lift pump and control assesmbly from well.	5a) Pinch, cut, or abrasion when using hand tools. b) Back strain. c) Contact with hydrocarbon-impacted ground water. d) Slip, trip, or fall. e) Release or spill of impacted ground water.	5a) Use correct tool(s) for the task and use tool(s) properly; use leather (or kevlar) work gloves. b) Use proper lifting techniques, bend at knees and not with back. c) Wear nitrile gloves under work gloves and wear safety glasses. d) Place hose and wiring out of immediate work area as it is removed from the well. e) Place pump in a 5-gallon metal bucket or other containment upon removal from the well. e) Have spill containment socks available and be prepared to deploy.

JOB SAFETY ANALYSIS FORM

Job Title: Ground Water Sampling	**Location:** Former Mobil Oil Renton Terminal #46-080 2423 Lind Ave. SW, Renton, WA	**Page** 1 of 1
Equipment: Air and Water Quality Meters, Truck, Peristaltic Pump, Absorbant Pads, and Hand Tools	**Supervisor:** Jim Twiford	**Analysis By:** Jacob Clark

Required Personal Protective Equipment:

Hard Hat	**Cut-Resistant Work Gloves**	**Slip Resistant Steel Toe Boots**
Safety Glasses	**Nitrile Gloves**	**Traffic Vest**
		Air Monitoring Instrument

Sequence of Basic Job Steps	**Potential Hazards**	**Recommended Actions**
Assess the work conditions		
1) Mobilization to Well Location	1a) Vehicle collisions b) Vehicle striking worker(s)	1a,b) Assess overall traffic level; demobilize if excessive. a,b) Stand/kneel facing traffic.
2) Stage Equipment (Hazards and Recommended Actions Apply to All Job Steps)	2a) Slip, trip, or fall b) Back strain	2a) Keep work area free of obstructions (stage equipment to one side of well, minimum 2-foot distance from step and work area). b) Bend at knees.
3) Access and Open Well Box	3a) Hand or finger injury from sharp edges on tools, scraping against ground surface, or pinch point with well lid b) Flammable gases c) Biological hazards	3a) Use proper tools and wear cut-resistant work gloves. a) Do not position fingers under well lid. b) Test HC concentrations around well box and in well box. c) Inspect well box, clean with screwdriver or other tool as warranted (with protected hands).
4) Access and Open Well	4a) Hand or finger injury from scraping or bumping against inside of well box b) Flammable gases	4a) Properly loosen well cap, wear work gloves. b) Test HC concentrations around well box and in well box.
5) Purge Well and Monitor Ground Water Quality Parameters	5a) Skin or eye contact with impacted waters 5b) Release of impacted water	5a) Wear safety glasses and nitrile gloves. 5b) Check all tubing connections prior to starting pump. 5b) Fill temporary purge such that spill during transfer is minimized. Never overfill. 5b) Fill VOAs over purge container.
7) Collect Ground Water Samples	7a) Spill of contaminated water b) Skin or eye contact with impacted waters c) Hand or finger injury from	7a) Stage and fill sample containers over absorbant pad b) Wear safety glasses and nitrile gloves. c) Handle sample containers on flat surfaces. c) Use cut-resistant work gloves when tightening VOAs.
8) Secure Well and Well Box	8a) Hand or finger injury from sharp edges on tools, scraping against inside of well box or ground surface, or pinch point with well lid.	8a) Use proper tools and wear cut-resistant work gloves. a) Do not position fingers between well lid and well box ring.
9) Clean-up and Wrap-up	9) Same as steps 1) and 2)	9) Same as steps 1) and 2)
COMMENTS:		

JOB SAFETY ANALYSIS FORM

Job Title: Hand Auger Boring and Slide Hammer Operation	**Location:** Former Mobil Bulk Terminal, 2423 Lind Ave., Renton, WA	**Page** 1 of 2
Equipment: Hand Auger, Slide Hammer, Extensions, Sample Sleves, Pipe Wrenches, Trench Plate, Probe	**Supervisor:** James Twiford	**Analysis By:** John Mattey

Required Personal Protective Equipment:

Hard Hat	**Steel Toed Boots**	**Dust Mask**
Safety Glasses	**Nitrile Gloves**	
Leather Gloves	**Reflective Traffic Vest**	

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
		Perform SPSA before each step
1) Mobilization	1a) Vehicular and pedestrian traffic	1a) Only mobilize to areas where traffic control has been verified. a) Drive defensively, follow all traffic laws. a) Don steel toed boots, traffic vest, hard hat and gloves (standard PPE). a) Use spotter to guide vehicle in congested work areas. a) Set up exclusion zone using cones or delineators linked with caution tape. a) Check for utilities and locator marks.
2) Equipment Preparation	2a) Muscle strains, cuts, impacts b) Pinch Points c) Slip, trip, or fall	2a) Use proper lifting techniques; get help as warranted. a) Wear work gloves. a) Inspect hand auger and slide hammer. Apply teflon tape to to threads on extensions to facilitate unscrewing after work is completed. b) Use caution not to pinch fingers while sing pipe wrenches. c) Keep area free of obstruction e.g. sampling equipment and samples.

3) Hand Augering	3a) Contact with impacted soils b) Contact with underground utilities c) Flammable gases d) Pinch points and moving parts e) Muscle strains, cuts, impacts f) Temperature Stress g) Vehicular traffic h) Noise i) Slip, trip, or fall j) Open boring	3a) Don nitrile gloves. a) Wash with soap and water upon any contact with skin. a) Flush eyes with eyewash upon contact. a) Wash with soap and water prior to eating (no eating or drinking in work zone). b) Probe prior to advancing hand auger. The probe should have a fiberglass shaft and insulated handles. The probe should have a blunt tip and be advanced slowly by hand. b) The hand auger should be turned slowly not forced through the soil and have blunt edges. Insulating gloves or insulated mat should be used when advancing hand tools. c) Monitor breathing zone and borehole with appropriate air monitoring equipment. c) Have fire extinguisher readily available. d) When adding extensions to the hand auger avoid pinching skin with pipe wrenches. e) Keep back straight when lifting, get help as warranted. f) Break as warranted during temperature extremes. f) Drink plenty of fluids during work day. g) Be aware of changing site conditions. g) Use buddy system. h) Wear hearing protection. i) Keep work space free of obstruction e.g. sampling equipment and samples. j) Use trench plate if boring is to remain open after personnel have le

JOB SAFETY ANALYSIS FORM

Job Title: Hand Auger Boring and Slide Hammer Operation	**Location:** Former Mobil Bulk Terminal, 2423 Lind Avenue, Renton, WA	**Page** 2 of 2
Equipment: Hand Auger, Slide Hammer, Extensions, Sample Sleves, Pipe Wrenches, Trench Plate	**Supervisor:** James Twiford	**Analysis By:** John Mattey
4) Use trench plate(s) to cover open hole if is to reamin open during a period of inactivity	4a) Muscle strain, cuts, and impacts b) Pinch pionts and moving parts c) Damage to incomplete well or boring d) Vehicular traffic e) Slip, trip, or fall	4a) Use a crane to move trench plate a,b,c,d,e) Use extreme care when moving trench plate c,d) if in a high vehicle impact area, two or more trench plates should be used c,d,e) The edges of the trench plate should be ramped with asphault cold patch to allow smooth transition over the plates c,d,e) Trench plates should be readjusted with new asphault cold patch whenever the boring is accessed.
5) Slide Hammer Sampling	5a) Muscle strain, cuts, and impacts b) Contact with impacted soil, or water c) Slip, trip, or fall	5a) Keep back straight when using slide hammer. a) Avoid possible steelsplinters that may develop during slide hammer operation. a) Do not overstress muscles during slide hammer sample extraction. a) Wear Kevlar or leather work gloves. b) Wear nitrile gloves with standard PPE. c) Keep work space free of obstructions.
6) Demobilization	6a) Muscle strains, cuts, impacts b) Slip, trip, or fall c) Vehicular traffic	6a) Use proper lifting techniques, get help as warranted. b) Keep work area free of obstruction, e.g. tools. c) Use spotter to manuever vehicles. c) Assess plan to move vehicles. c) Drive defensively.
7) Check that all tools, trash, and equipment have been picked up and work area is left in a clean	7a) Slip, trip, or fall b) Muscle Strain from lifting heavy object	7a) Double check work area to ensure that all tools, equipment and trash has been removed. b) Bend at the knees, and lift with the legs.
COMMENTS		

JOB SAFETY ANALYSIS FORM

Job Title: Operations and Maintenance (General)	**Location:** Former Mobil Terminal, Renton, WA	Page 1 of 1
Equipment: GW pumps, tanks, air stripper, control panels	**Supervisor:** John Shaal	**Analysis By:** Brian Richardson

Required Personal Protective Equipment:

Hard Hat	**Traffic Vest**	**Slip Resistant Steel-Toed Boots**
Safety Glasses	**Hearing Protection**	**Air Monitoring Instruments**
Work Gloves (cut-resistant and nitrile)		

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Movement into and out of treatment system area over concrete containment berms and over unimproved and uneven ground surface; set-up for work.	1a) Slip, trip, fall hazard. b) Back strain from carrying tools and equipment. c) Possible noise irritation from operation of pumps and blower (applies to all steps). d) Traffic from terminal operations (applies to all steps).	1a) Make sure a clear path exists before moving around treatment system. a) Watch path while walking. b) Use proper lifting techniques; lift with legs, not with back. c) Wear hearing protection to reduce noise to a maximum level of 85 decibels. d) Wear traffic vest and look for traffic before stepping into and walking through paved area.
2) Survey work area for safe conditions.	2a) Possibility of hazardous atmosphere. b) Hazards from improper housekeeping.	2a) Check atmosphere in equipment enclosure with LEL meter. b) Complete hot work checklist to mitigate unsafe conditions.
3) Check operational status and record process readings.	3a) Slip, trip, fall hazard.	3a) Do not inspect system while walking, plant both feet when taking readings. a) Keep work area and walking areas clear of tools and equipment.
4) Make operational adjustments.	4a) Improper operation leading to system shutdown, equipment damage, permit exceedance, or ground water release.	4a) Adjust system to operate within limits specified in the operation and maintenance manual.
5) Possible repair of metal piping or valves.	5a) Pinch point hazards when operating hand tools. b) Skin cuts from sharp metal edges.	5a) Use correct tool(s) for the task and use tool(s) properly. a,b) Wear cut-resistant work gloves.
6) Possible repair of PVC piping or valves.	6a) Skin injury from sharp edges on cutting tool(s). b) Contact of skin with PVC primer or glue. c) Inhalation of PVC glue and primer vapors.	6a) Use correct tool(s) for the task and use tool(s) properly. a) Operate tool(s) with cutting surface away from body. a) Wear cut-resistant work gloves. b) Wear nitrile gloves. c) Do not breath vapors directly and keep pipe at arm's length away from nose and mouth.
7) Perform electrical troubleshooting as necessary.	7a) Electrical shock hazard while checking fuses or other electrical components.	7a) Open operation and maintenance manual and follow lockout/tagout procedures.

JOB SAFETY ANALYSIS FORM

Job Title: Cutting and Joining PVC pipe	**Location:** Former Mobil Terminal 2423 Lind Ave SW Renton, WA	Page 1 of 1
Equipment: General tools, PVC primer and glue	**Supervisor:** Jim Twiford	**Analysis By:** Brian Richardson

Required Personal Protective Equipment:

Hard Hat
Safety Glasses
Work Gloves (cut-resistant)
Traffic Vest
Air Monitoring Instruments
Slip Resistant Steel-Toed Boots
Nitrile Gloves

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Hold PVC pipe with one hand on a flat work surface and hold saw with other hand.	1a) Cutting of fingers, hands or legs. b) Debris in eyes.	1a) Wear cut-resistant work gloves while cutting. a) Wear slip-resistant steel-toed boots to avoid slipping. a) Hold pipe far enough from cut to minimize risk of hand injury. b) Wear safety glasses.
2) Place pipe where it is to be used to check for proper fit.	2a) Slip, trip or fall.	2a) Watch footing when stepping over secondary containment berms or conduit runs.
3) Bevel pipe ends.	3a) Cutting of fingers, hands or legs. b) Debris in eyes.	3a) Wear cut-resistant work gloves while cutting. a) Wear slip-resistant steel-toed boots to avoid slipping. b) Wear safety glasses.
4) Apply primer and glue to pipe and fittings.	4a) Eye or skin contact with glue or primer. b) Inhalation of vapors.	4a) Wear nitrile gloves and safety glasses. b) Use in a well-ventilated area, and work upwind of glue/primer or use a respirator.
5) Check pipe and fittings for proper engagement.	5a) Spill hazard. b) Equipment damage.	5a,b) Check for leaks or misaligned fittings.

JOB SAFETY ANALYSIS FORM

Job Title: Stripper Tower Air Filter Changeout	**Location:** Former Mobil Terminal, 2423 Lind Ave SW Renton, WA	Page 1 of 1
Equipment: Replacement air filters	**Supervisor:** Jim Twiford	**Analysis By:** Dan Sweet

Required Personal Protective Equipment:

Hard Hat	**Traffic Vest**	**Slip Resistant Steel-Toed Boots**
Safety Glasses	**Work Gloves (cut-resistant)**	**Air Monitoring Instruments**

Sequence of Basic Job Steps	Potential Hazards	Recommended Actions
1) Movement into treatment system area over conduit and over unimproved and uneven ground surface; set-up for work	1a) Slip, trip, fall hazard.	1a) Make sure a clear path exists before moving around treatment system. a) Watch path while walking.
2) Survey work area for safe conditions	2a) Possibility of hazardous atmosphere. b) Hazards from improper housekeeping.	2a) Check atmosphere in equipment enclosure with FID. b) Complete EMES daily permit and contact supervisor.
3) Shut down system		3a) Refer to section 9.2 of the O&M manual for instructions.
4) Apply lock out/tag out to system	4a) Possible injury / equipment damage.	4a) Refer to section 7 of the O&M manual for detailed LOTO procedures. a) Complete EMES daily permit including LOTO section.
5) Remove 3 old filters	5a) Dust hazard from old filter.	5a) Stand up-wind from filter during removal.
6) Install 3 new filters		
7) Remove lock out/tag out to energize system	7a) Possible injury / equipment damage.	7a) Check filter for proper orientation. a) Refer to section 7 of the O&M manual for detailed LOTO procedures.
8) Restart system		8a) Refer to section 9.1 of the O&M manual for instructions.

APPENDIX F

Sampling Techniques

APPENDIX F—SAMPLING TECHNIQUES

Proper sampling techniques must be followed so that samples represent actual field conditions and that samples are labeled, preserved, and transported properly to retain sample integrity. This appendix describes procedures to be followed by Acton • Mickelson • Environmental, Inc. (AME), during collection of subsurface soil and ground water samples and remediation system process samples. Sampling guidance documents from the American Society of Testing and Materials (ASTM), U.S. Environmental Protection Agency (EPA), and California Environmental Protection Agency (Cal-EPA) will be followed for all sampling procedures. Actual sampling procedures to be employed will be based on field conditions and may differ from those described here.

1. Exploration Boring/Soil Sampling Procedures

Soil borings and soil sampling will be performed under the direction of an appropriately registered AME professional. The soil borings unless otherwise specified will be advanced using a truck-mounted, hollow-stem auger drill rig.

Soil samples will be collected at vertical intervals of not more than 5 feet. Soil sampling will be done in general accordance with ASTM D1586-84 (reapproved 1992), modified to allow the use of a 2-inch-diameter split-barrel sampler. Using this procedure, three 2-inch-diameter, 6-inch-length, brass tubes are placed in a California-type split-barrel sampler. The sampler is driven into the soil by a 140-pound weight falling 30 inches. After driving the sampler an initial set of 6 inches (seating drive), the number of blows required to drive the sampler an additional 12 inches is known as standard penetration resistance, or the "N" value. The "N" value is used as an empirical measure of the relative density of cohesionless soil and the consistency of cohesive soil.

Upon recovery of the split-barrel sampler, the brass tubes containing the soil will be removed. One of the three brass tubes will be sealed at the ends with Teflon® tape and plastic end caps. The percent recovery of the sample will be recorded. The sample will be labeled with an identification number, time, date, location, and requested laboratory analysis. The sample will then be placed in a plastic bag and stored at approximately 4° Celsius (C) in an ice chest for transport to the laboratory. Sample custody procedures outlined in Section 7 of this exhibit will be followed. This will be performed for each sample collection.

Soil in one of the brass tubes will be extracted upon recovery, placed in a plastic bag, sealed, and placed out of direct sunlight for later screening for organic vapors using a photoionization detector (PID) or a flame ionization detector (FID). The remaining portion of the soil sample will be examined and a complete log of soil conditions will be recorded on a soil boring log (Enclosure A) using the Unified Soil Classification System (Enclosure B). The soil will be examined for composition, color, and moisture content.

The split-barrel sampler will be cleaned to prevent cross-contamination for each sampling interval using procedures described in Section 4.

Soil borings will normally be advanced with 8- or 10-inch-diameter, hollow-stem augers. The soil generated from the soil borings will be stored in 55-gallon drums and labeled with the corresponding boring number, date, and address of the facility. Alternatively, the soil generated from the soil borings may be wrapped in plastic and stored on site until characterized for disposal.

2. Measurements of Water Level and Apparent Thickness of Phase eparated Hydrocarbons,Also Known as Liquid-Phase Hydrocarbons

For sites where PSH may be present, the static water level and apparent PSH thickness in each well will be measured with an electronic interface probe prior to purging or sampling. The wire of the interface probe is marked at 0.01 foot intervals. One tone is emitted from the interface probe if PSH is encountered; another tone for water. The wire of the interface probe will be lowered slowly until PSH or water is encountered. At this point, the mark on the interface wire opposite the permanent reference point on the top of the well casing will be read to the nearest 0.01 foot and recorded. If the first encountered substance is PSH, the probe will be lowered until the tone corresponding to water is emitted. This depth will also be recorded. The difference between the two depths corresponds to the apparent PSH thickness. The interface probe will be rinsed in a cleaning solution and deionized water between measurements in different wells.

A disposable bailer will be used to collect a sample of PSH, if present in a well, for subjective analysis. The sample will be collected by gently lowering the bailer approximately one-half the bailer length past the air/PSH interface. The appearance (color, opacity, "freshness") will be described and noted on field notes.

For sites where PSH is not present, either a conductance probe level meter or an electronic interface probe will be used to measure static water level. The conductance probe level meter emits a steady tone upon encountering any conductive fluid (i.e., water). Like the interface probe, the wire of the conductance probe level meter has markings at 0.01 foot intervals, and the procedure for obtaining static water levels with the conductance probe level meter is basically the same as for an interface probe when PSH is not encountered.

A permanent reference point will be marked on the well casings. The permanent reference point on the well casings will be surveyed to a common reference point. All well casing riser elevations will be known to within 0.01 foot.

3. Ground Water Sampling

Ground water sampling will be done in general accordance with ASTM D4448 (reapproved 1992).

3.1 Well Evacuation

Where monitoring well purging is required prior to collection of a ground water sample, stagnant water will be removed from the well casing and the surrounding gravel pack by bailing, pumping, or with a vacuum truck. At least three casing volumes of water will be removed from each well from which a sample is to be collected (unless low-flow purging is performed for measurement of

dissolved oxygen as described in Section 3.2). The volume of water in the casing will be determined from the known elevation of the water surface, the well bottom elevation (as measured when the well is installed), and the well diameter.

If the well is bailed or pumped during purging, samples will be collected and field analyzed for pH, temperature, and specific conductance. The well will be considered stabilized when repeated readings of the following parameters are within the ranges indicated as follows:

- Specific conductance ±10 percent of the reading range
- pH ±0.1 pH unit
- Temperature ±0.5° C

After stabilization, and after at least three casing volumes are evacuated, a sample will be collected for analysis. The field container used for well stabilization measurements, and the pH, temperature, and conductivity probes will be rinsed between wells with deionized water.

All purge water will be containerized and properly handled and documented for disposal. If the containers are stored on site, a label specifying the date of purging, source, and the known or suspected nature of the contents will be affixed to each container.

3.2 Low-Flow Well Evacuation (Measuring Dissolved Oxygen)

Where accurate measurement of dissolved oxygen (DO) concentration is necessary, a low-flow purging method is used. Ground water is removed from the well at a rate of 0.25 gallon per minute or less. The ground water purge flow is directed into a flow-through sampling chamber containing a field analyzer for DO. The well is considered stabilized and the DO concentration recorded when repeated measurements of DO are within a range of 0.1 milligram per liter. The well can then be sampled as described in Section 3.4 even if less than three casing volumes of ground water are removed.

3.3 Geoprobe® Sampling

Undisturbed ground water samples may be obtained with a Geoprobe® sampling apparatus. When the termination depth of a boring is reached (i.e., when soil is observed to be wet, but not saturated), a Geoprobe® sampling apparatus will be driven approximately 2 feet into the saturated zone. The tool will then be withdrawn approximately 18 inches to expose the inlet screen and allow ground water to flow into the interior of the sampling device. The Geoprobe® will be withdrawn from the subsurface after allowing ample time for the sampling device to fill with ground water.

After the Geoprobe® is retrieved, a stop cock will be attached to the device for sample retrieval. The sample will then be placed in laboratory-supplied containers.

3.4 Sample Collection, Preservation, and Handling

A new polyethylene disposable bailer will be used to collect ground water samples for analysis. The bailer is attached to a new disposable rope and lowered slowly into the water to avoid agitation of

the collected sample. Containers for volatile organics analyses will be filled completely so that no airspace remains in the vial after sealing.

All sample containers will be prewashed and prepared at the analyzing laboratory in accordance with quality assurance/quality control protocols of the laboratory. Only sample containers appropriate for the intended analyses will be used.

After sample collection, the samples will be placed into coolers with ice packs. Internal temperature of the cooler will be maintained at approximately 4º C. Samples will be kept in coolers during transport to the analyzing laboratory.

4. Remediation System Sampling and Monitoring

4.1 Water Sampling

Water samples will be collected in the container(s) appropriate for the analysis. Containers will be filled from a sampling port. After collection, samples will be placed into coolers maintained at approximately 4 degrees C and kept in coolers until delivery to the analyzing laboratory.

4.2 Air and Soil Vapor Sampling

Process air and soil vapor samples for laboratory analysis will be collected in either Tedlar sampling bags or evacuated Summa canisters. The sampling container will be filled from a process sampling port. A vacuum pump connected to the sampling port will be used to fill Tedlar bags, and to fill Summa canisters when the sample is from a process point under vacuum. After collection, samples will be placed into coolers at ambient temperature to block exposure to direct sunlight and will be kept in coolers until delivery to the analyzing laboratory.

4.3 Air and Soil Vapor Monitoring

Field monitoring of process air (or soil vapor) will normally be performed with an FID. Using a sampling port with discharge tubing running into an open-top sample bottle (e.g., 500-milliliter polyethylene), the sampling port valve is opened to allow sample flow into the sample bottle. A vacuum pump is used to produce sample flow from process points under low or negative pressure. With sample flowing through the open-top bottle, the FID probe is inserted into the sample bottle and the reading recorded upon reaching steady state. As an alternative to the FID, a Draeger® tube can be inserted in the sample bottle and a measurement obtained following the specific instructions for the type of tube used.

Field monitoring of vadose zone soil vapor may be performed with an FID or a lower explosive limit (LEL) meter. The probe of the FID or LEL meter is lowered to the screen interval of the well and the highest reading is recorded. Alternatively, a vacuum pump can be connected to the wellhead and a measurement obtained from a sample bottle as described above.

5. Decontamination Procedures

All equipment that comes in contact with potentially contaminated soil, drilling fluid, air, or water will be decontaminated before each use. Decontamination will consist of steam-cleaning, a high-pressure, hot-water rinse, or trisodium phosphate (TSP) or Alconox®/Liquinox® wash and freshwater rinse, as appropriate.

Drilling and sampling equipment will be decontaminated as follows:

1. Drill rig augers, drill rods, and drill bits will be steam-cleaned prior to use and between borings. Visible soil, grease, and other impurities will be removed.

2. Soil sampling equipment will be steam-cleaned prior to use and between each boring. Prior to individual sample collection, any sampling device will also be cleaned in a TSP or Alconox®/Liquinox® solution and rinsed twice in clean water. Any visible soil residue will be removed.

3. It is anticipated that disposable equipment will be used to collect water samples. If disposable equipment is not used, water sampling equipment will be decontaminated using methods described in Item 2 above for soil sampling equipment.

4. Water sampling containers will be cleaned and prepared by the respective analytical laboratories.

5. Stainless steel or brass soil sampling tubes will be steam-cleaned or washed in TSP or Alconox®/Liquinox® solution and rinsed with clean water.

6. Field monitoring equipment (pH, conductivity, or temperature probes) will be rinsed with clean water prior to use and between samples.

6. Field Measurements

Field data will be collected during various sampling and monitoring activities; this section describes routine procedures to be followed by personnel performing field measurements. The methods presented below are intended to ensure that field measurements are consistent and reproducible when performed by various individuals.

6.1 Buried Utility Locations

Prior to commencement of work on site, AME will contact appropriate utility companies to have underground utility lines located. All work associated with the borings will be preceded by hand augering to a minimum depth of 5 feet below the ground surface to avoid contact with underground utilities.

6.2 Lithologic Logging

A log of soil conditions encountered during drilling and sample collection (Enclosure A) will be maintained using the Unified Soil Classification System (Enclosure B) by an AME geologist. All boring logs will be reviewed by a California registered geologist.

The collected soil samples will be examined and the following information recorded: boring location, sample interval and depth, blow counts, color, soil type, moisture content (qualitative), and depth at which ground water (if present) is first encountered. Also recorded on the soil boring logs will be the field screening results obtained using a portable PID or FID.

6.3 Conductivity, Temperature, and pH

Specific conductance, water temperature, and pH measurements will be made when a water sample is collected. Regardless of the sample collection method, a representative water sample will be placed in a transfer bottle used solely for field parameter determinations. A conventional pH meter with a combination electrode or equivalent will be used for field-specific conductance measurements. Temperature measurements will be performed using standard thermometers or equivalent temperature meters. Combination instruments capable of measuring two or all three of the parameters may also be used.

All instruments will be calibrated in accordance with manufacturer methods. The values for conductivity standards and pH buffers used in calibration will be recorded daily in a field notebook. All probes will be thoroughly cleaned and rinsed with fresh water prior to any measurements, in accordance with Section 5.

7. Disposal Procedures

Soil and fluids that are produced and/or used during the installation and sampling of borings, and that are known or suspected to contain potentially hazardous materials, will be contained during the above operations. These substances will be retained on site until chemical testing has been completed to determine the proper means of disposal. Handling and disposal of substances known or suspected to contain potentially hazardous materials will comply with the applicable regulations of the Cal-EPA, the California Department of Water Resources, and any other applicable regulations. Soil and fluids produced and/or used during the above-described operations that appear to contain potentially hazardous materials will be disposed of appropriately.

Residual substances generated during cleaning procedures that are known or suspected to pose a threat to human health or the environment will be placed in appropriate containers until chemical testing has been completed to determine the proper means for their disposal.

8. Sample Custody

This section describes standard operating procedures for sample custody and custody documentation. Sample custody procedures will be followed through sample collection, transfer, analysis, and ultimate disposal. The purpose of these procedures is to assure that (1) the integrity of samples is maintained during their collection, transportation, and storage prior to analysis and (2) post-analysis sample material is properly disposed of. Sample custody is divided into field procedures and laboratory procedures, as described below.

8.1 Field Custody Procedures

Sample quantities, types, and locations will be determined before the actual fieldwork commences. As few people as possible will handle samples. The field sampler is personally responsible for the care and custody of the collected samples until they are properly transferred.

8.1.1 Field Documentation

Each sample will be labeled and sealed properly immediately after collection. Sample identification documents will be carefully prepared so that identification and chain-of-custody records can be maintained and sample disposition can be controlled. Forms will be filled out with waterproof ink. The following sample identification documents will be utilized.

- Sample labels
- Field notebook
- Chain-of-custody forms

8.1.2 Sample Labels

Sample labels provide identification of samples. Preprinted sample labels will be provided. Where necessary, the label will be protected from water and solvents with clean label-protection tape. Each label will contain the following information:

- Name of collector
- Date and time of collection
- Place of collection
- AME project number
- Sample number
- Preservative (if any)

8.1.3 Field Notebook

Information pertinent to a field survey, measurements, and/or sampling will be recorded in a bound notebook or on the daily field log. Entries in the notebook should include the following:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity

- Location of sampling or measurement activity
- Name(s) and title(s) of field crew
- Type of sampled or measured media (e.g., soil, ground water, air, etc.)
- Sample collection or measurement method(s)
- Number and volume of sample(s) taken
- Description of sampling point(s)
- Description of measuring reference points
- Date and time of collection or measurement
- Sample identification number(s)
- Sample preservative (if any)
- Sample distribution (e.g., laboratory)
- Field observations/comments
- Field measurements data (pH, etc.)

8.1.4 Chain-of-Custody Record

A chain-of-custody record will be filled out for and will accompany every sample and every shipment of samples to the analytical laboratories in order to establish the documentation necessary to trace sample possession from the time of collection. The record will contain the following information:

- Sample or station number or sample I.D
- Signature of collector, sampler, or recorder
- Date and time of collection
- Place of collection
- Sample type
- Signatures of persons involved in the chain of possession
- Inclusive dates of possession

The laboratory portion of the form should be completed by laboratory personnel and will contain the following information:

- Name of person receiving the sample
- Laboratory sample number
- Date and time of sample receipt
- Analyses requested

- Sample condition and temperature

8.1.5 Sample Transfer and Shipment

Samples will always be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody record. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis. The chain-of-custody record will accompany each shipment. The method of shipment, courier name(s), and other pertinent information will be entered in the chain-of-custody record.

8.2 Laboratory Custody Procedures

A designated sample custodian will accept custody of the shipped samples and verify that the information on the sample label matches that on the chain-of-custody record. Information regarding method of delivery and sample conditions will also be checked on the chain-of-custody record. The custodian will then enter the appropriate data into the laboratory sample tracking system. The laboratory custodian may use the sample number on the sample label or may assign a unique laboratory number to each sample. The custodian will then transfer the sample(s) to the proper analyst(s) or store the sample(s) in the appropriate secure area.

Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted. Once at the laboratory, the samples are handled in accordance with U.S. Environmental Protection Agency SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, Third Edition, for the intended analyses. All data sheets, chromatographs, and laboratory records will be filed as part of the permanent documentation.

8.3 Corrections to Documentation

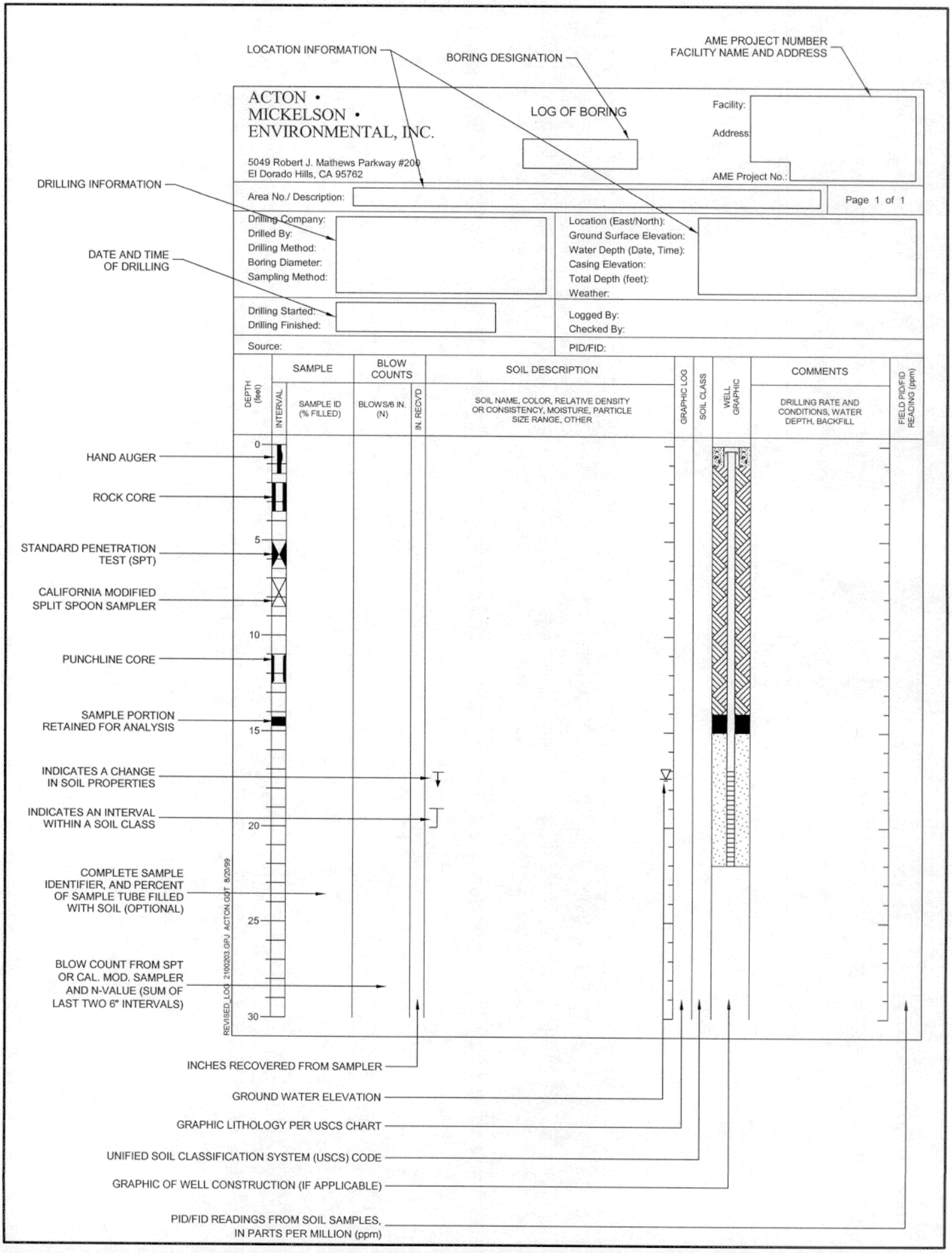
Original data recorded in field notebooks, chain-of-custody records, and other forms should be written in ink. These documents should not be altered, destroyed, or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made or found on a document, the individual making the corrections will do so by crossing a single line through the error, entering the correct information, and initialing and dating the change. The erroneous information will be obliterated. Any subsequent error(s) discovered on a document will be corrected. All corrections will be initialed and dated.

8.4 Sample Storage and Disposal

Samples and extracts should be retained by the analytical laboratory for 30 days after receipt. Unless notified by the program manager, excess or unused samples should be disposed of by the laboratory in an appropriate manner consistent with applicable government regulations.

ENCLOSURE A
BORING LOG KEY



ENCLOSURE B
UNIFIED SOIL CLASSIFICATION SYSTEM CHART

MAJOR DIVISION			SYMBOL		GROUP NAME[A] AND TYPICAL DESCRIPTION
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)		GW[B]	**WELL-GRADED GRAVEL**[C]: GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP[B]	**POORLY-GRADED GRAVEL**[C]: GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (MORE THAN 15% FINES)		GM[B]	**SILTY GRAVEL**[C]: GRAVEL - SAND - SILT MIXTURES
				GC[B]	**CLAYEY GRAVEL**[C]: GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)		SW	**WELL-GRADED SAND**[D]: GRAVELLY SANDS, LITTLE OR NO FINES
				SP	**POORLY-GRADED SAND**[D]: GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (MORE THAN 15% FINES)		SM	**SILTY SAND**[D]: SAND - SILT MIXTURES
				SC	**CLAYEY SAND**[D]: SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL PASSES THE NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	**SILT**[E]: INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	**LEAN CLAY**[E]: INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	**ORGANIC CLAY/ORGANIC SILT**[E]: ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT 50 OR GREATER		MH	**ELASTIC SILT**[E]: INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	**FAT CLAY**[E]: INORGANIC CLAYS OF HIGH PLASTICITY
				OH	**ORGANIC CLAY/ORGANIC SILT**[E]: ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	**PEAT**: HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTES: A) IF FIELD SAMPLE CONTAINS COBBLES OR BOULDERS, ADD "WITH COBBLES" AND/OR "WITH BOULDERS" TO GROUP NAME
B) DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS WITH 5-15% FINES. ADD "WITH SILT" OR "WITH CLAY" TO GROUP NAME
C) IF SOIL CONTAINS 15% OR MORE SAND, ADD "WITH SAND" TO GROUP NAME
D) IF SOIL CONTAINS 15% OR MORE GRAVEL, ADD "WITH GRAVEL" TO GROUP NAME
E) IF SOIL CONTAINS 30% OR MORE PLUS NO. 200, ADD "SANDY" OR "GRAVELLY" TO GROUP NAME. IF 15-25%, ADD "WITH SAND" OR "WITH GRAVEL", WHICHEVER IS PREDOMINANT.